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Your COMPUTER

FEBRUARY 1986 VOL. 6 NO.2

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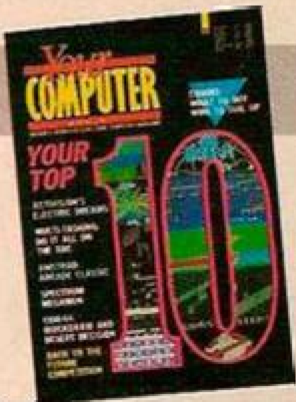
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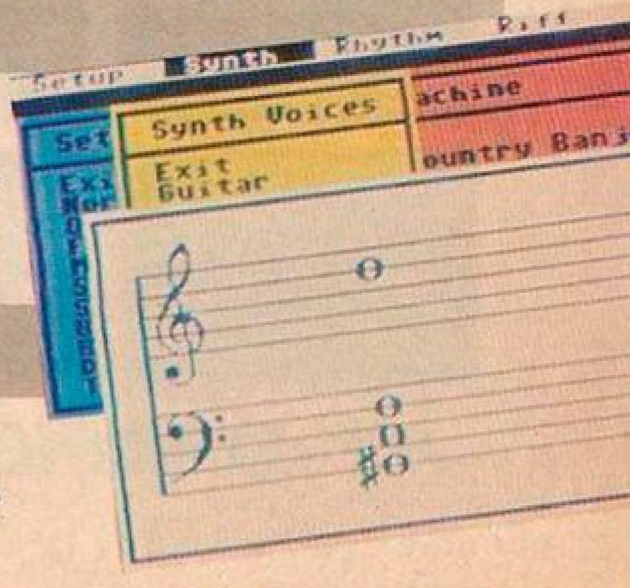
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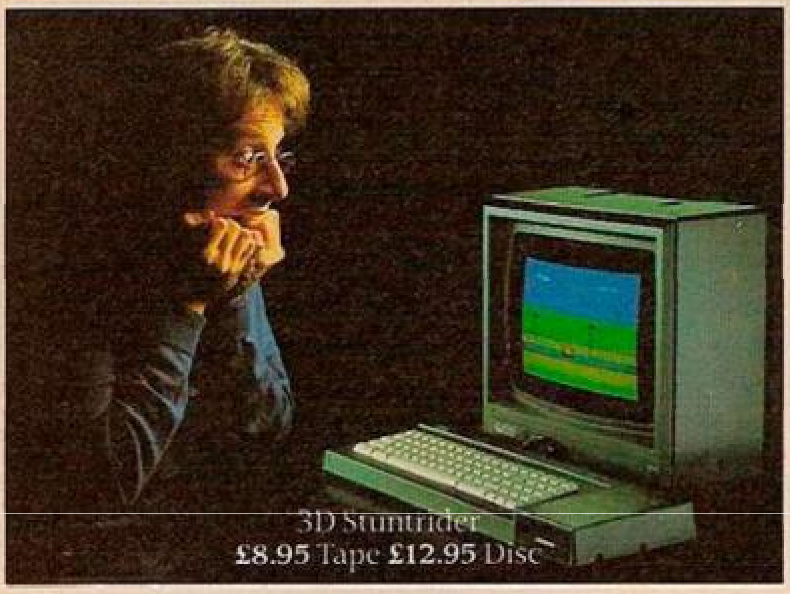
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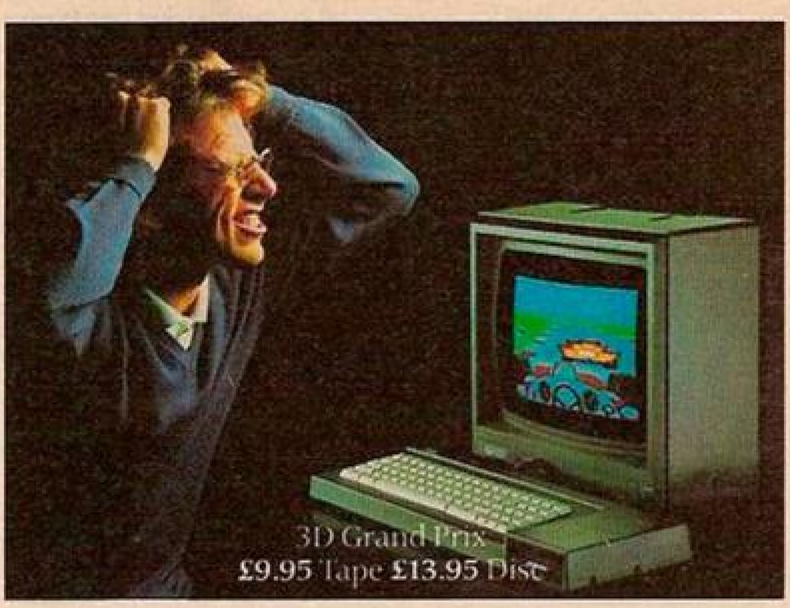


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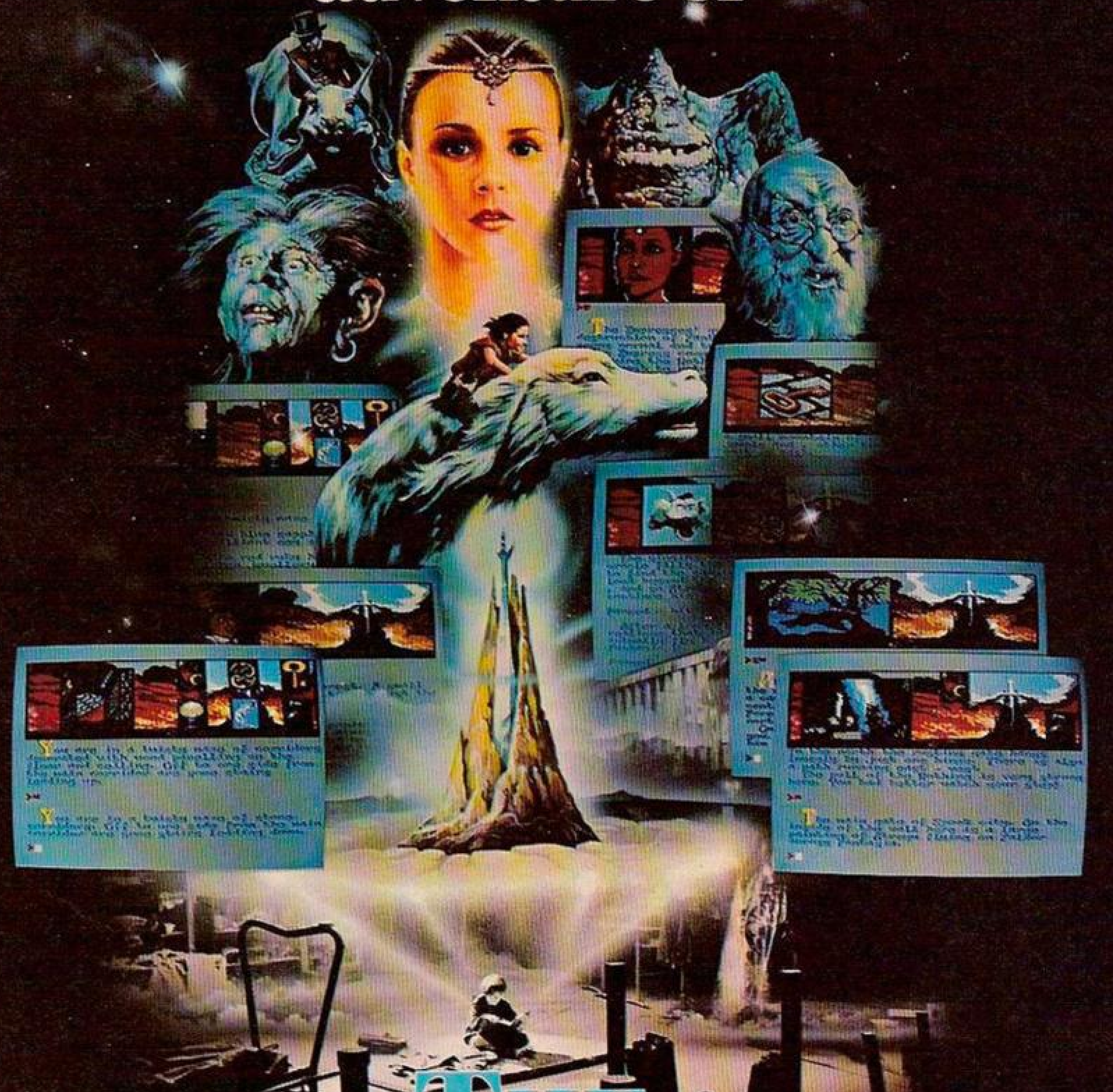
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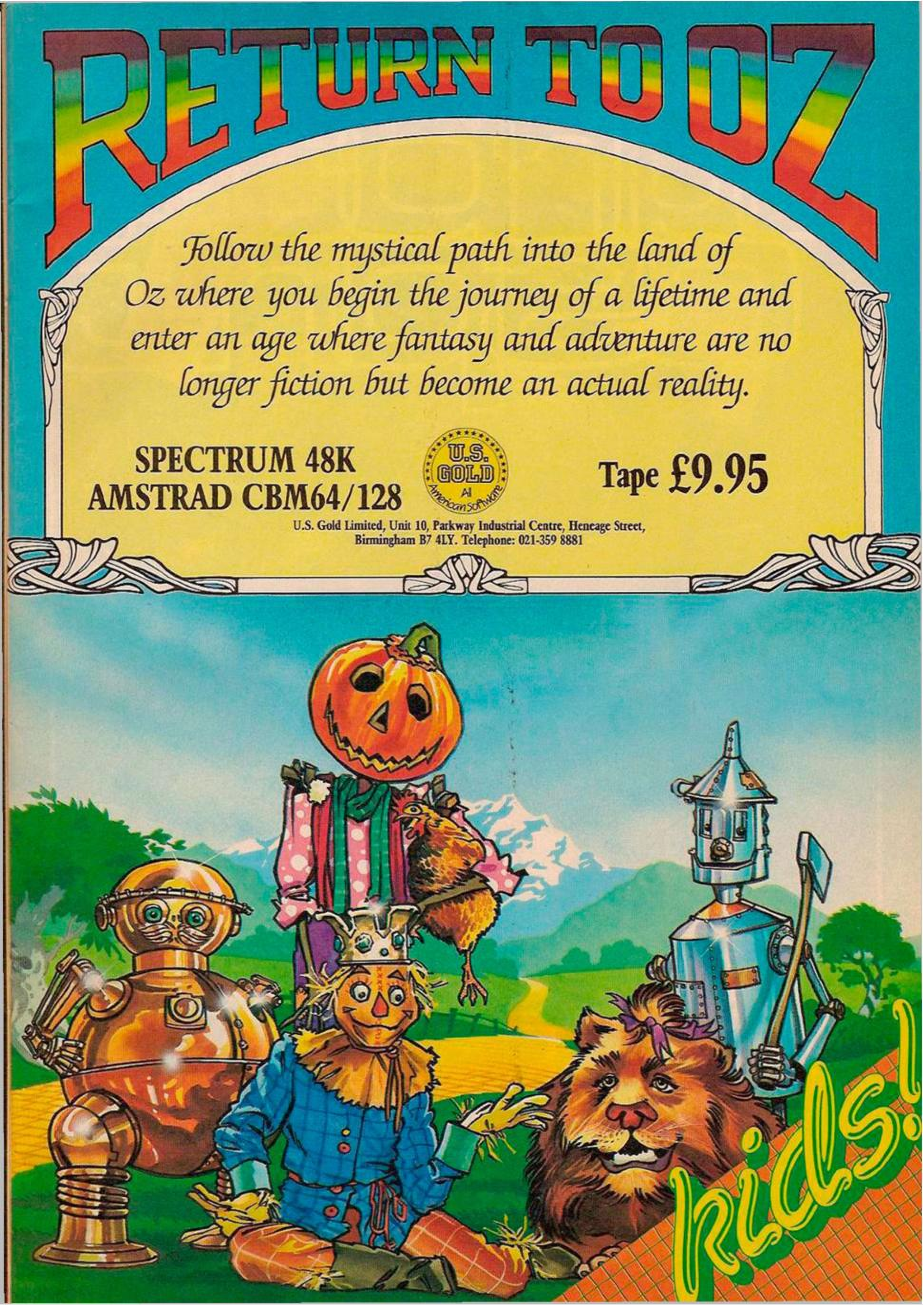
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A WOLF IN CHEAP CLOTHING

COMPUTER MANUFACTURERS are now offering the buying public new hardware that is difficult to fault on value for money grounds. The word new is important because there are plenty of older designs around that are being offered at prices that seem like a bargain — but only to the unwary. More experienced hands will realise that some of this bargain priced hardware is not supported by low cost software nor indeed much software at all. A computer, no matter how elegant its design, is just a collection of electronic components that will do very little of use.

In their efforts to make the best of bad marketing decisions in the past, some companies have dumped stocks onto the market at give away prices — better to have some cash in the bank rather than pile of computers that no one will buy at their original price. In these moves the manufacturers have found ready allies in some of the major High Street electrical chains.

While the reasons for these kinds of actions are perfectly understandable few would disagree that in the long term the industry as a whole is not well served by dumping. First time buyers of a machine that has no software support are not likely to maintain their interest in computing as a hobby, indeed their bad experience will give the world of micro computing a bad image.

To return to the more up-beat message of the opening sentence there are still plenty of good machines on the market today with many more in the pipeline. Your Computer will continue to monitor new developments in computing and will bring reviews of the latest hardware as soon as it becomes available. We'll also keep a close eye on the latest software developments for both the newest computers and those that add to the wide range of software available for some of the more 'mature' products. In preparing these reviews we will not be blinkered by any hype put out by the manufacturer nor by any technical gimmicks that are of little practical use. In short we will continue to bring you all the news and information that will help you get the most out of your computer.

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The Master 128, still the same old Beeb?

Acorn unveils Master series

The long-awaited redesign of the BBC Micro finally saw the light of day in January with the launch of the BBC Master series micro from Acorn.

The Master series in not one, but five new variations on the BBC Micro — ranging from the Master 128 to the 32-bit Master Scientific.

The machine which is most likely to appeal, however, is the Master 128, which will sell for £499. Aside from the obvious 128K RAM, View, Viewsheet software and Advanced Disk Filing System (ADFS) — the Master 128 also includes the 65C12 processor running at 2 Mhz, BBC Basic Version 4.0, a program and text editor called Edit and two Acorn cartridge software sockets.

The other three BBC Master series models are:

- The Master 512 — A 512K MS-DOS version of the Master 128. Like all the machines in the Master range, the 512 is a co-processor upgrade of the 128 machine and can thus run all software written for the basic model. It includes everything you get in the Master 128 plus Digital Research's Macintosh-like Gem on disk, a mouse pointer device, the MS-DOS and CP/M 86 operating systems, 512K RAM and the Intel 80186 16-bit processor.
- The Master Turbo — This is another co-processor machine which places a high-speed CMOS-based 65C102 processor alongside the existing 128 cpu.

The two processors are linked by the Beeb's unique 'Tube' interface and a special version of BBC Basic known as 'HI-BASIC' is employed to optimise use of the memory and improve this processor's already impressive 4 Mhz speed. The upgrade from Master 128 to Turbo will cost £125.

- The Master Scientific — To take advantage of Acorn's longtime stake in the market for computers among the country's research and development community, the company has bolted a National Semiconductor 32016 32-bit processor on this version. The Scientific runs at a lightning-fast 8 Mhz and comes with half a Megabyte of RAM and its own 'Pandora' operating system. FORTRAN, Pascal and C software are also included with the system.

FAT MACINTOSH

The original 128K Apple Macintosh is dead, long live the 512K 'Fat' Mac and the Macintosh Plus. This was the rallying cry at Apple's annual shareholder meeting in January as the company unveiled the new Macintosh which would take the company into the second half of the 1980s.

The new machine is fully compatible with the old (which can, in fact, be upgraded to the spec of the new machine), but includes a minimum RAM size of 1Mb (expandable up to 4Mb) a SCSI (pronounced 'scuzzy') interface port, a new 128K ROM operating system, 800K disk drives and speed improvements up to five times those on the 'old' machine.

The Mac Plus is expected to sell for about £2300 in the UK — and thus will push down the price of the existing 512K Mac to about £1800 (and perhaps bring the price of the now-discounted 128K Mac to a mere £1000 or so). It — and upgrades for existing 128K and 512K machines — went on sale at the end of January.



Fat Mac, Apple fights back on Amiga/ST front

Pricing for the range isn't entirely clear, but it is evident that the machines won't be cheap. The cheapest machine is now the £399 Master ET (Econet Terminal) — a stripped-down version of the basic Master 128 machine which removes the 6522 'sideways scrolling' chip and the 'bundled' word-processing, spreadsheet, terminal and disk filing software and adds network filing system software.

Games tape comes "Off The Hook"

The British computer software industry has once again banded together under a charitable banner — this time to raise money for drug abuse rehabilitation.

The 'Off The Hook' campaign was launched at a January meeting of the Guild of International Software Houses and the International Society of Software Artists. It follows the highly successful Soft Aid tape, which last year raised £350,000 for famine relief

The Off The Hook tape will feature software from Activision, US Gold, Ocean, Gremlin Graphics, Ultimate, Firebird, Melbourne House, Elite and Beyond. About £4.00 of the proceeds from sale of the £6.99 will go directly to the Princes Trust for Drug Abuse Rehabilitation — and the organisers are hoping to raise at least £100,000 in this way. The compilation tape will be offered for the BBC Micro, Spectrum, Commodore and Amstrad machines.

Corby closes

Commodore UK started 1986 with a bang — the sound of doors slamming shut on 250 assembly jobs at the company's Corby plant.

The closure brings an effective end to the UK manufacturing of Commodore 64s and 128s. C16s and Plus-4 computers were also assembled at the Corby plant.

The move comes after months of disappointing financial results for Commodore — with the ironic exception of November and December, when pre-Christmas sales of all the company's products — in particular the Commodore 64 — were quite healthy. It also indicates a need for Commodore to get back to doing what it does best — selling lots of computers at cheap prices — and that any further forays into the business market will have to be very carefully thought out.

The company's 1985 venture into the highly-competitive IBM PC market (with its PC10 and PC20 compatible computers) met with some success, but it's pinning much of this year's hopes on the Amiga super-micro. The Amiga, however, is a strange beast to pin down. It's got the best sound and graphics you're likely to see on a machine this side of £10,000, but it's priced to hit a market that is normally not used to needing synthesizers or paintbox software.

No Gem on Atari ST

Atari has abandoned the Digital Research Gem Draw and Gem Write software for 'bundling' with its 520ST computer. In place of the DR products, Atari will now offer 1st Word by GST of Cambridge and DB Master One; a database from DB Master.

Atari has also thrown a couple of other software packages into the suite; an asteroids-style game called Megaroids and a less-comprehensive drawing program known as Doodle.

'We do not have copies of Gem Write and Gem Paint available for shipping and have decided to make alternative arrangements,' said Atari.

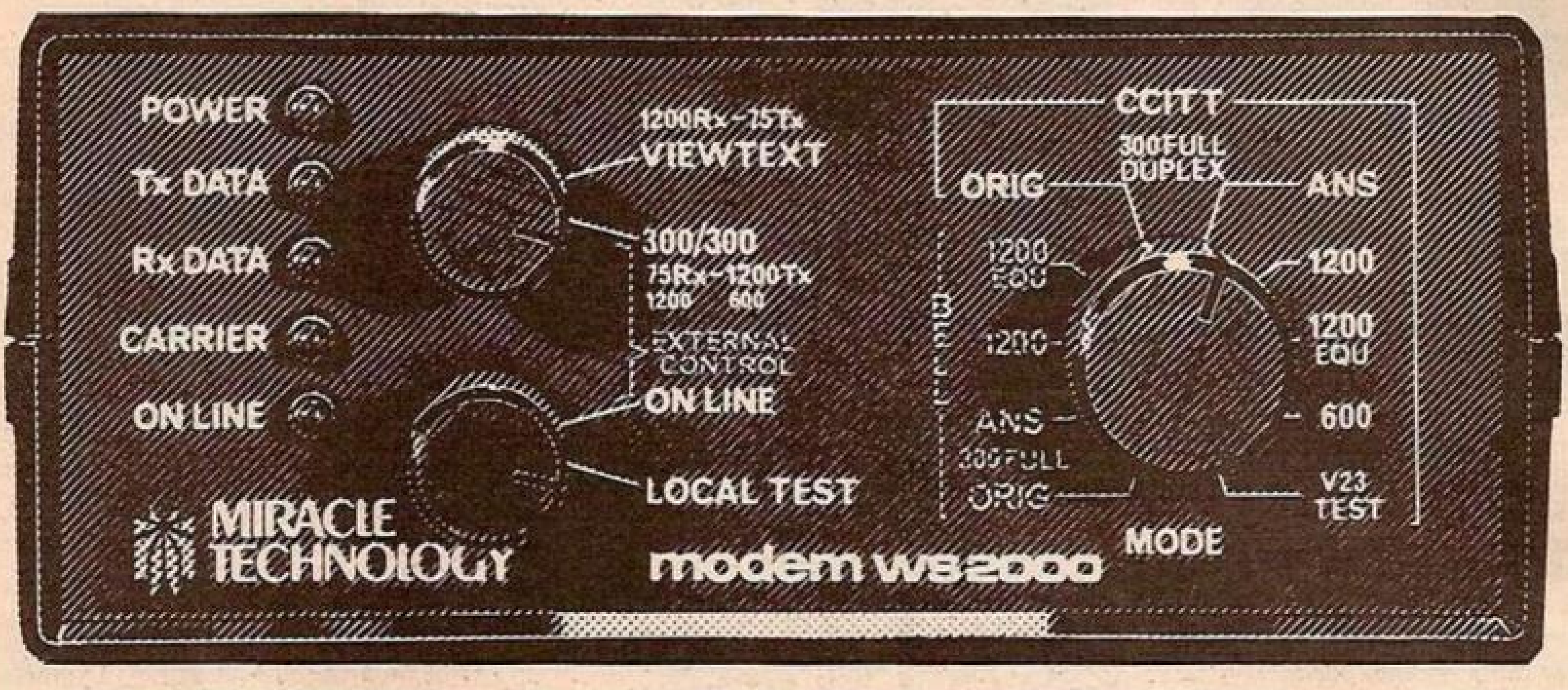
Timex Portugal

Timex Portugal are shortly to announce a new disk system for the Sinclair Spectrum. In one box it has its own Z80 and two 3 inch disk drives (a la Amstrad). It comes with CP/M and has two printer ports.

What is really interesting is that a short while later they are releasing a professional keyboard. This connects into the disk system totally replacing the Spectrum. The combination is in effect a completely new computer.

The Liverpool software house mentioned last month as having a hit with their version of Underwurlde have done it again. The ultimate game they have copied this time is Sabre Wulf, and a good job they've done of it too.

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Soft News

(continued from page 13)

Industry rumour has it that Amstrad are in fact working on three new computers. In addition to the ST alike mentioned last month there is to be a PC compatible and the inevitable portable.

On a recent visit to Japan, Alan Sugar asked for production of 3 inch media to be increased. In return the Japanese asked for a commitment that his next machine would use this media. He couldn't make this promise because his next machine uses 5¼ inch media. It has to, in order to be IBM compatible. Rumoured price is in the £400 to £500 region.

Of course this switch to 5¼ inch disks won't help existing Amstrad owners. You are more likely to see Lord Lucan ride Shergar down Oxford Street than find a reliable source of the 3 inch media.

Just before Christmas Uncle Clive threw a party for the industry. The impressive venue was Magadalene College Cambridge. Most of the industries VIPs were there. Heads of software houses, distributors, large retailers and senior Sinclair staff. There was, however, one notable absence; Sir Clive himself. He missed his own party.

More facts are beginning to emerge about the Apple Carla, scheduled for September 1986 release. It will use the 68020 processor with a full 32 bit data bus. With this alone it would have enough power to obliterate the opposition. But there's more, it's going to run at double the clock speed as well. A bit like having one of the better minicomputers on your desk.

On the display front it will have double density graphics. There will also be a colour version and screens will be available in a variety of sizes.

Elsie Dee

ULTIMATE TURN GOLD

Ultimate, producers of classic titles such as Knightlore and Alien 8 are to be marketed by U.S. Gold.

This move, predicted by Bruce Everiss in last month's issue, follows the pattern of Ariolasoft's link up with Lamasoft.

It is not entirely clear whether there has been a merger or if the two companies remain entirely separate. For the time being, Ultimate games will continue to appear with their usual logo and style. However, it will mean that Ultimate can take advantage of U.S. Gold's experience in marketing, manufacturing and promotion, leaving Ultimate free to get on with developing their games.

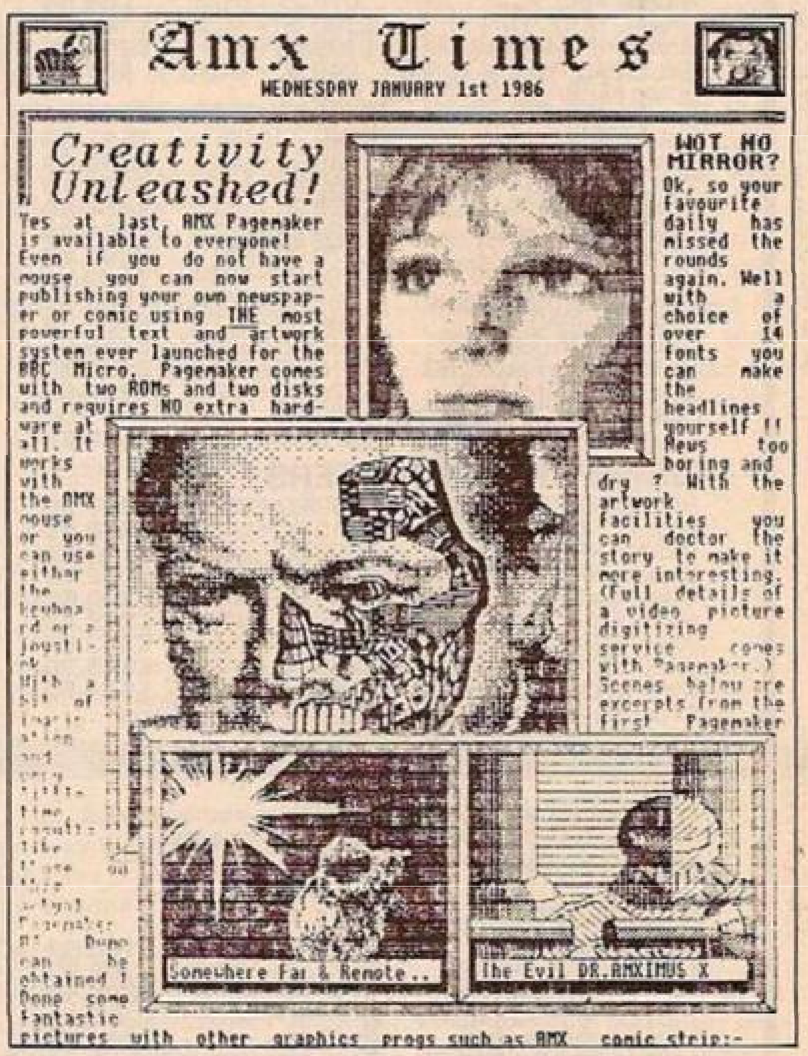
This, combined with other labels under the Centresoft banner such as Gremlin Graphics, Ocean, and Imagine means that the company controls marketing and promotion of products which account for well over 50 per cent of the market. In another deal, after the collapse of Websters, the software distributors, Centresoft may well still further strengthen their hand by winning the contract to distribute to Boots, a large software retailer. The first of this year's releases from Ultimate/U.S. Gold are scheduled for the end of January. They are Dragon Skulle for the CBM-64, Cyberrun and Petagram, both on the Spectrum.

Dragon Skulle is the completion of the Sir Arthur Pendragon trilogy. Your quest is set on a desert island where you must find the evil Skulle, and fight your way against the Skulles evil minions. Cyberrun is an arcade adventure set out in space where you must make a fast buck carrying Cybernite around, which apparently makes you very popular with the local pirates with inevitable results.

PAGEMAKER FROM AMS TO BATTLE UNCLE BOB

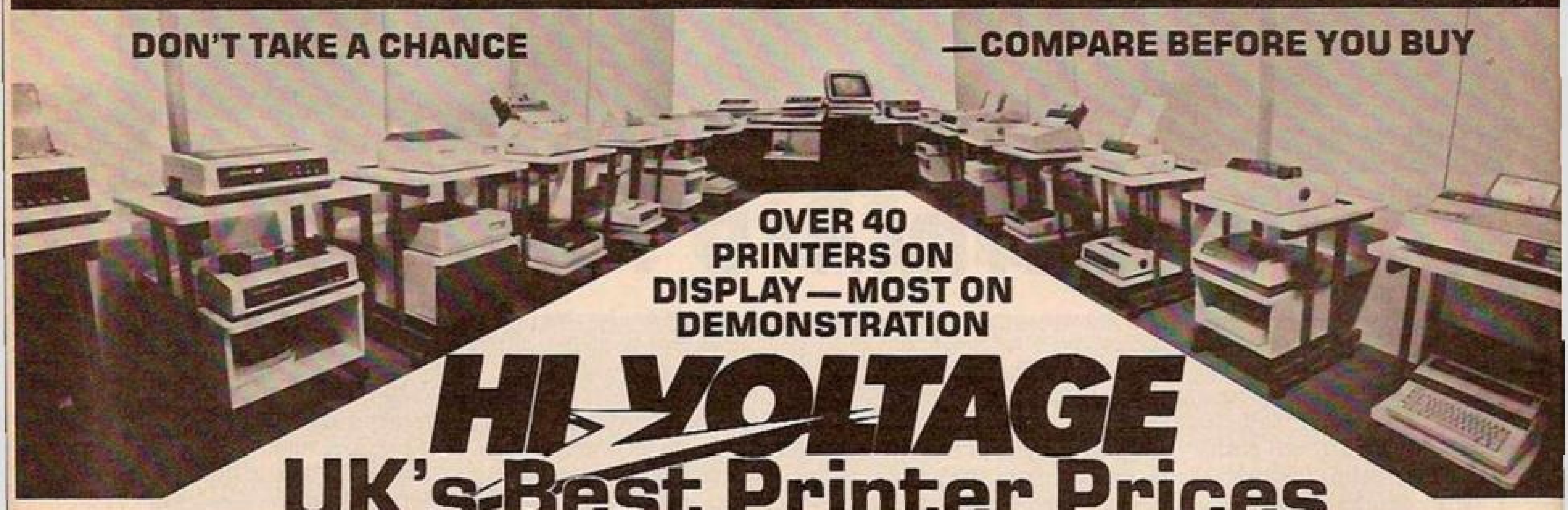
A newspaper war has broken out — but this time bingo cards and page three girls are not involved.

The combatants are a subsidiary of Robert Maxwell's giant Mirror Group Newspapers and a small firm of graphics specialists, AMS. AMS made a name for themselves with the AMX mouse on the BBC, they have since followed it up with a version for the Amstrad, and soon the Spectrum. Their new program, AMX pagemaker allows you to compose and print a newspaper page made up from text and digitised pictures. Whilst it might not be the sort of thing Eddie Sha or Rupert Murdoch might be in the market for, at £49.95 it would be well within the pocket of many smaller operations. The program, which is icon driven is controlled by either the



AMX mouse, keyboard or joystick. It is too early to tell if either this, or the rival Mirrorsoft program Fleet Street Editor (with free robot Maxwell poster), will make a big splash, but AMS certainly appear confident they can beat their more illustrious rival. Nick Pearson, managing director of AMS believes his product "can more than look after itself in the newspaper war. It's the first on sale, and its got a better specification."

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SQUITS IN

Your correspondent Peter Turner writes from Norway in the January issue to complain that Psion's Scrabble needs updating because it uses words like "squits" and "vision" that do not appear in his Chambers dictionary. My update ambition would be to have more words, not less.

Is it Scrabble that needs the update or Peter's spectacles? His complaint is a complete mystery because both of the words are long-standing inclusions in Chambers.

Words like "squits" and "vision" are part of the common armoury of the "good players" that Peter claims to represent and if he goes into battle with nothing better than a pocket dictionary and another extremely out-of-date one, then he's just the opponent I'd choose to play for cash!

Gordon West,
Barton Dunterton,
Devon.

Dear Ian Mac Naught Davis,



The home computer software industry in the UK has grown like Topsy in the last few years. It is now about a third the size of the record industry. Unfortunately it doesn't get a third the television time that the record industry does.

The programme you present, Micro Live, is one of the few examples of enlightened recognition of computing. For the millions of micro users it is a rare chance to find out more about their hobby from television. The Old Grey Whistle Test of computing. Your programme probably attracts more viewers than the combined readership of all the micro magazines. This is an enormous influence to wield. The difficulties involved make your programme easy to criticise — so that is what I am about to do.

The unfortunate relationship between BBC Enterprises and Acorn that produced the BBC Computer is reflected in Micro Live. In the real world the percentage of users of the BBC machine is minute, real people use Commodore 64's and Sinclair Spectrums. If the BBC broacast to the real world they should serve the intersts of their viewers not the interests of BBC Enterprises. You are guilty of Microcomputer apartheid.

The largest single use of computers is games playing. This is irrefutable and absolute fact. Watching Micro Live a visiting Martian would think we use these machines principally as musical instruments. The paucity of games reviews on a microcomputer programme is amazing. The absence of the games charts unforgivable. As to the fetish about computer music, this is just throwing away valuable television air time.

One of the most powerful uses of television is the person to person interview. It has made people like Terry Wogan, Michael Parkinson and David Frost. It would seem an ideal mechanism for inclusion in Micro Live. Interview of the week, I am sure I am not alone in wanting this. Just think of all the potential victims. Mike Singleton, Uncle Clive, Alan Sugar, John Gibson, Mel Croucher and so on ad nauseum. Much more interesting than computer music.

The final criticism regards news. This really is a fast moving, exciting industry. It must be to support two trade weeklies. Yet to watch Micro Live you would think it was as boring as the pot plant industry. Compared with the trade and consumer weeklies your superficial news section misses just about every story. Going out live you are in a position to produce a really good news section that would be of real interest to everyone. Why don't you?

The above comments are meant constructively and I hope they are taken as such. Micro Live is one of the very few true mass media events representing the Microcomputer industry. As such it is of critical importance.

Bruce Everiss

IN TOUCH
How to write for Your Computer

We called this magazine *Your Computer* precisely because we welcome you views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting you name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Telsoft

Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC and the Commodore which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068.

SNOWBOOTS BOTCH

My Snowbots program published in the January '86 volume of *YC* was a bit of a disaster. Apart from the Australian style screen shot — yes, it was upside down — — not my fault I hasten to add.

The lack of the explanatory REMark statements causes

(continued on page 19)

Your letters

more problems than might be imagined. Most CBM users will be able to cope with the control characters etc. but some important points are shown below.

Line 10:
The final set of quotes is — "< dot hm ins s/sp>" the *shifted* space is very important.

Line 7000 should read —
sys36888:print"< clr gr2 >"11$< s/★ 22cd <": print "< cl ins s/★ hm cd >"chr$(142)

Line 7200 & 7400 should read —
pokess,.:< followed by the print statements as in line 7000 above >

Line 8000:
Control characters are "< clr c/n c/h wht >"

Line 16660:
The last data value is 150.

Now for the bit that was my fault — while the unconventional method of starting the game does work, it appears that very occasionally it generates an apparent error at the very start of the game — there are two ways to deal with this. Firstly just ignore the error, clear the screen and enter either RUN (which will lose the high score) or GOTO8000 (which will). To get rid of the problem completely make the following modifications —
In line 9130 change the value of KC to 36954 then enter the following lines:-

```
8060 td=0:poke198,0
8070 td=td+u:iftd>99then goto 8010
8080 getk$:ifk$="<f1>"then goto 10
8090 ifk$="<f3>"then 7000
8099 goto8070
```

This will get rid of the problem but will not allow the almost instant start of the previous method.

(All text enclosed in <...> should be interpreted as required — not typed literally.)

Keith Suddick,
Jarrow,
Tyne and Wear.

YC POKES

I thought you might like to hear of some excellent pokes for some excellent games which have appeared in *Your Computer* over the last few issues. They are as follows:

Terrapin
POKE 29525, no. of bombs at start
POKE 29779, no. of bombs you get when bonus star collected (yellow)
Spraymania
POKE 27108, (time per level)
POKE 27160, lives
Dangerous Gardens
POKE 28277, no. of lives
To The Top
POKE 29411, no. of lives
Mad Caverns
POKE 29332, no. of lives

All the above pokes for lives, etc can only be in the range (0-255).

C J Smith,
Westbury,
Wiltshire.

KUNG FU OFFER

Due to overwhelming response to my Kung Fu free tape offer in November's issue, I cannot record any further tapes. But I am now in a position to copy the program for the minority of people whose tapes I returned unrecorded. I have received several tapes without S.A.E.s. To those whom it may concern please send an S.A.E. and you will receive your tape. I have also received an order from a Bedford reader for some additional tape but with no return address.

If he could contact me his tapes will be forwarded to him.

B Lewis,
Bridgnorth,
Shropshire.

ENDZONE

Thanks for publishing my Amstrad program "ENDZONE" in *YC*, Jan. '86. Unfortunately I missed out the last byte, so the score mechanism does not work. The last line of DATA should be:-

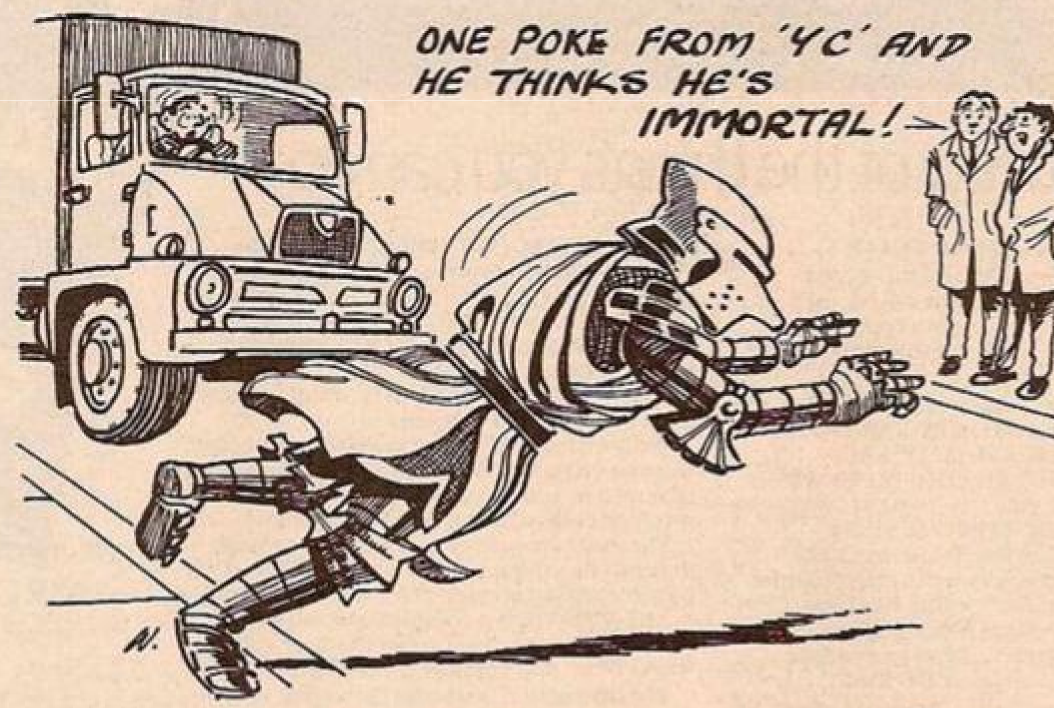
4970 DATA EB,C1,CB,2A, CB,1B,C9,9999

the 0 should have been C9. Also to save the game, it should have been

SAVE "ENDZONE": SAVE "EZCODE",B, 35000,4876

The "save" published was 1 byte less than it should have been. My apologies for any disappointed readers.

S Cartwright,
Gabalfa,
Cardiff.



UNFAIR TO CLIVE

The title of the article in last month's *Your Computer*, "Knight Clubbing" was accurate even though the text left a lot to be desired in a supposedly serious article.

Clive Sinclair's claim to fame lies with his ability to provide cheap usable computing power via the ZX80, ZX81 and Spectrum. The idiosyncracies of each machine should not be allowed to mar his true place in the progress of home computing.

Prior to Clive, the market did not exist. His machines indicated then confirmed that such a market existed. The comments about mail order tactics are petty: those about pre-product releases are correct but regretfully are commonplace in the computer industry. Other manufacturers including IBM have had similar problems so why pillory Clive alone?

There appears to be something wrong with making a profit. This totally ignores the fact that the machines were significantly cheaper than anything else available at the time. I see no criticism of Acorn or others for their price structure initially or even now!

Why the total abhorrence of single keystroke Basic especially when my IBM PCs have 10 function keys designed to imitate this feature in a broader context.

Clive is not a magical culture figure who is never wrong. Many of the detailed criticisms are correct but then hindsight is the perfect science. As a result of his activities a new industry exists including *Your Computer'* and the employees thereof.

B Jacobs,
Hull,
Humberside.

NOW YOU CAN EXPLOIT SPECTRUM GRAPHICS TO THE ULTIMATE.

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With Print 'n' Plotter's 'GRAPHICS SUITE', everything is made so simple you won't believe it.



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Facilities include: DRAW, PLOT, ARC, CIRCLE, FILL IN SOLID OR PATTERNS, FILL IN OVER MODE, DRAW RADIALLY, ARC RADIALLY, ENLARGE TO EDIT, PAPER WASH, BOX DRAW and so on . . .

As well as drawing, PAINTPLUS has a tremendous UDG section. It also has UDG "grabbing" from screen as well as full facilities for defining, saving and loading UDG sets.

The Organiser section of the program enables you to automatically store multiple screen graphics or multiple UDG banks.

PAINTPLUS comes with a demo of screens, animation and alternative character sets, plus a copy of Print 'n' Plotter PICTURE BOOK – 100 pages of instructions, hints, tips, listings and related graphics information.

SCREEN MACHINE (GRAPHICS SUITE 2)

SCREEN MACHINE is *the* graphics manipulator.

Use it when you want to take your graphics and turn them into professional machine coded data for use in BASIC or M/Code programs.

For instance:

SCREEN MACHINE will compress the memory consumption of your graphics to cram even more into the computer's memory –

As well as memory compression, SCREEN MACHINE allows you to put your graphics through a series of highly-sophisticated graphics manipulations.

These include ENLARGE, REDUCE, RELOCATE TO OTHER PARTS OF THE SCREEN, STEP AND REPEAT, BLEND SCREENS TOGETHER, RECOLOUR SELECTIVELY OR GLOBALLY, FLIP SCREEN, etc.

And SCREEN MACHINE also has a dedicated Text Compiler – ideal for anyone who uses lots of text for instructions or menus on screen.

SCREEN MACHINE also comes with a copy of PICTURE BOOK and a demo that's so good you can't believe it.

ART-O-MATIC (GRAPHICS SUITE 3)

Ever wanted to produce screen graphics for Adventure Games, Educational, Training, or Scientific programs and run out of memory because the graphics handling consumed too much memory?

If so, you need ART-O-MATIC, Print'n'Plotter's great new graphics compiler.

With ART-O-MATIC you can draw, define and store an incredible number of screens or parts of screen in your programs as compiled instant machine code which is usable from BASIC or M/C.

The exact amount of compression possible depends on your graphics, but up to 99% is possible and an average of 85%-90% is usual.

ART-O-MATIC is a complete graphics drawing program, so you can produce your works of art and compile at the same time.

The instruction book and demo that comes with the program show you *everything* you need to know about cramming great graphics into your Spectrum.

SPRITE MACHINE (GRAPHICS SUITE 4)

There have been a number of programs called Sprite Generators. Most of these are self-contained and not a great deal of use to people who want to use Sprites in their own programs.

SPRITE MACHINE is different. This program was written with *you* in mind – whether you are a professional, amateur or beginner.

There's never been a simpler Sprite program to use. All you have to do is draw your Sprite and then choose from a fantastic range of options to get it doing what *you* want.

You can: animate your Sprites, choose any direction and starting position, adjust speed, adjust height, choose running time, decide on edge actions such as bounce, wraparound, reflect or stop, make intelligent decisions like strike and collision actions, colour your Sprites or take colour from the screen, trace or non-trace, etc.

The program comes complete with a cursor-operated Sprite drawing board and catalogue/store function.

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The charts

TOP 30 OVERALL CHART

1	COMMANDO	ELITE
2	YIE AR KUNG FU	IMAGINE
3	RAMBO	OCEAN
4	THEY SOLD A MILLION	HIT SQUAD
5	WAY OF THE EXPLODING FIST	MELBOURNE HOUSE
6	WINTER GAMES	EPYX/US GOLD
7	ELITE	ACORNSOFT
8	COMPUTER HITS (10)	BEAU JOLLY
9	FORMULA ONE SIMULATOR	MASTERTRONIC
10	TRANSFORMERS	OCEAN
11	MERCENARY	NOVAGEN
12	ACTION BIKER	MASTERTRONIC
13	FINDERS KEEPERS	MASTERTRONIC
14	GYROSCOPE	MELBOURNE HOUSE
15	LITTLE COMPUTER PEOPLE	ACTIVISION
16	ARCADE HALL OF FAME	US GOLD
17	TOMAHAWK	DIGITAL INTEGRATION
18	BACK TO SKOOL	MICROSPHERE
19	SABOTEUR	DURELL
20	BMX RACERS	MASTERTRONIC
21	LORD OF THE RINGS	MELBOURNE HOUSE
22	NOW GAMES 2	VIRGIN
23	SPELLBOUND	MASTERTRONIC
24	BEACH HEAD 2	ACCESS/US GOLD
25	GOONIES	DATASOFT/US GOLD
26	STEVE DAVIS SNOOKER	CDS
27	ROBIN OF THE WOOD	ODIN
28	MONTY ON THE RUN	GREMLIN GRAPHICS
29	BEACH HEAD	ACCESS/US GOLD
30	ROCKMAN	MASTERTRONIC

This chart is based on the *MicroScope* chart as compiled by Gallup.

MicroScope GALLUP

MicroScope is the weekly trade paper of the microcomputer industry. If your computer store doesn't display the latest *MicroScope* chart, ask the manager to call Mark Salmon on 01-631 1433 — we'll send a copy every week.

BUBBLING UNDER

1	ZORRO	US GOLD
2	WINTER SPORTS	ELECTRIC DREAMS
3	GUNFRIGHT	ULTIMATE
4	KANE	MASTERTRONIC
5	ENIGMA FORCE	MONOLITH
6	MASTER OF MAGIC	MASTERTRONIC
7	BIG MAC	MASTERTRONIC
8	ARC OF YESOD	ODIN
9	DEATHWAKE	QUICKSILVA
10	GOLD RUN	MACSEN

COMMODORE SALES

THIS	LAST	MTHS	TITLE	PUBLISHER
01	02	02	COMMANDO	ELITE
02	03	02	RAMBO	OCEAN
03	01	03	WINTER GAMES	EPYX/US GOLD
04	05	02	LITTLE COMPUTER PEOPLE	ACTIVISION
05	NE	01	MERCENARY	NOVAGEN
06	04	02	LAST V8	MASTERTRONIC
07	08	02	THEY SOLD A MILLION	HIT SQUAD
08	06	02	FIGHT NIGHT	US GOLD
09	NE	01	ARCADE HALL OF FAME	US GOLD
10	NE	01	TRANSFORMERS	OCEAN

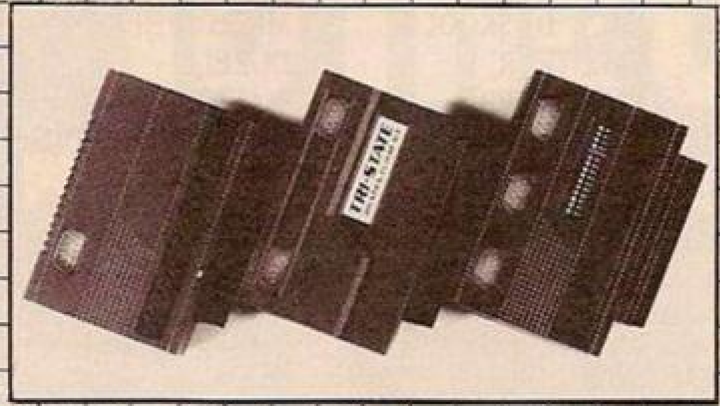
AMSTRAD SALES

THIS	LAST	MTHS	TITLE	PUBLISHER
01	01	02	THEY SOLD A MILLION	HIT SQUAD
02	06	02	YIE AR KUNG FU	IMAGINE
03	02	03	GRAND PRIX 3D	SOFTWARE INVASION
04	03	03	FORMULA ONE SIMULATOR	MASTERTRONIC
05	05	03	SOUL OF A ROBOT	MASTERTRONIC
06	04	03	FINDERS KEEPERS	MASTERTRONIC
07	NE	01	COMPUTER HITS (10)	BEAU JOLLY
08	NE	01	CAVES OF DOOM	MASTERTRONIC
09	07	03	NONTERRAQEQUS	MASTERTRONIC
10	NE	01	SCRABBLE	LEISURE GENIUS

SPECTRUM SALES

THIS	LAST	MTHS	TITLE	PUBLISHER
01	02	02	COMMANDO	ELITE
02	NE	01	YIE AR KUNG FU	IMAGINE
03	NE	01	RAMBO	OCEAN
04	01	02	ELITE	FIREBIRD
05	07	02	TOMAHAWK	DIGITAL INTEGRATION
06	03	02	BACK TO SKOOL	MICROSPHERE
07	06	02	SABOTEUR	DURELL
08	NE	01	LORD OF THE RINGS	MELBOURNE HOUSE
09	NE	01	SPELLBOUND	MASTERTRONIC
10	NE	01	WINTER GAMES	EPYX/US GOLD

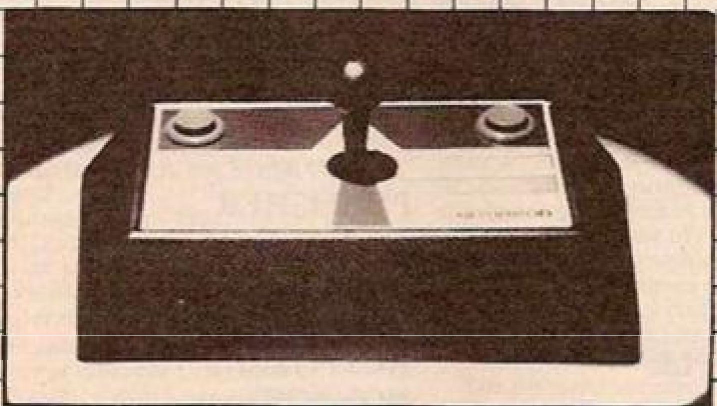
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MERCENARY

◆CBM64 & Atari ● Novagen ● Arcade Adventure ● £9.95 cass, £12.95 disc ● Lee Paddon

GRAPHICS
●●●●
SOUND
●●●●
PLAYABILITY
●●●●
VALUE FOR MONEY
●●●●●
OVERALL RATING
●●●●●

First, the bad news, you have crashed on an alien planet with only 9000 credits and a computer called Benson to your name. Second, the even worse news, you've landed slap bang in the middle of a war torn city called Targ. You have two modes, either zipping around at high speed in any of the various ships and vehicles hanging around the place, or trudging around corridors banging into walls on Shanks' Pony.

This first game in the planned series is called "Escape from Targ". Easier said than done. You've got to get a space ship. 9000 credits won't even make a down payment, so you've got to make some money. Fortunately, although there's not much call for computer journalists, you can make a crust by becoming a soldier of fortune. The two warring factions are the Palyars and Mechanoids. You can run little errands for them, and eventually discover how to get off the planet.

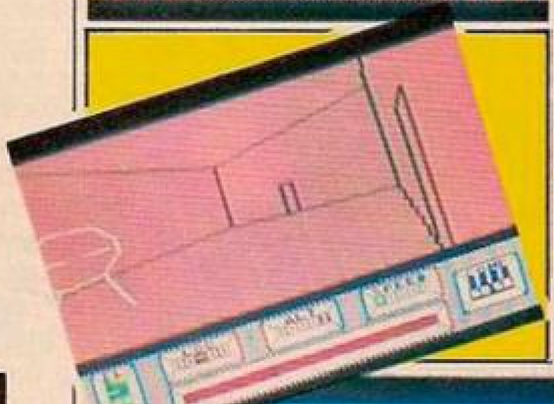
There are other more direct methods, like nicking the nearest interplanetary type ship, or if this seems too dull, you can have fun blowing up Mechanoid installations. Naturally the mechanoids take a dim view of this, and try to stop you. However, if you manage to destroy all 120 enemy installations, the Palyars are suitably grateful. Possibly they give you a ship just to be shot of an obviously homicidal maniac. However, the trouble here is identifying which installation belongs to whom.

Being a world simulator, things are on a truly global scale. There are 200 structures scattered around the city, 170 rooms in subterranean complexes, and loads of objects, 30 of which are vital to progress. There's no limit to the amount Benson can carry — which allows you to unleash your kleptomaniac instincts, ripping off everything that isn't nailed down.

One little job you may take on will take you to the Palyar command ship, orbiting high above the planets surface. Once inside, be careful, as one wrong turn could give you a very rapid aerial view of the city, with no way of getting back up again. Arcade freaks will enjoy the vector graphics, except for the rather disconcerting way you can fly through things. This is a minor quibble on what is otherwise an excellent game on a truly epic scale.

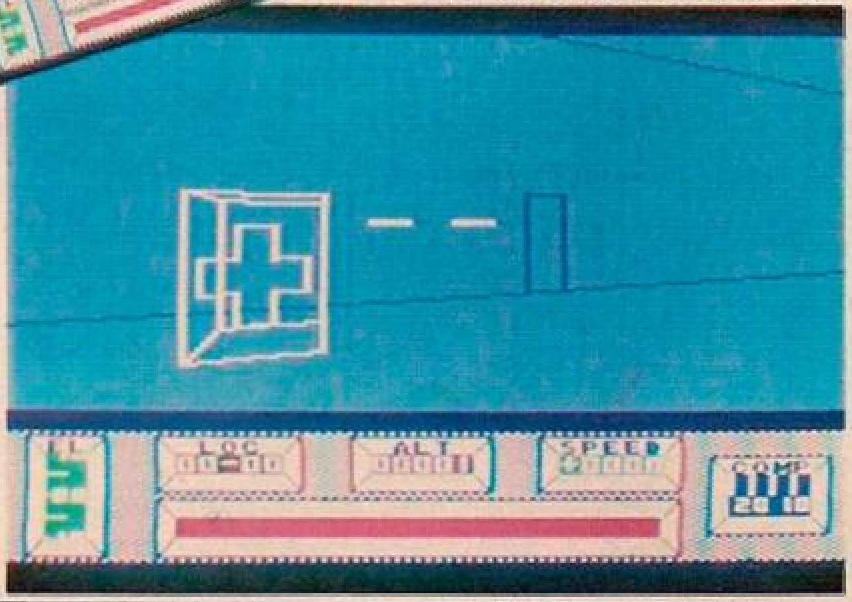
Novagen can consider themselves forgiven for keeping everyone waiting all this time — in the end they have brought out a bug-free, well thought out and absorbing product.





SCREENS

● The underground complexes, take anything that isn't nailed down



SCREENS

● Skimming over the surface of Targ.

In an industry full of larger than life, over hyped self publicists, Paul Wokes stands out from the crowd. Retiring to the point of being a recluse, he lets his products do the talking for him.

About as close as you'll ever get to him is Bruce Jorden, the marketing man of Novagen, the two man outfit set up by Paul in 1985 to market his first game "Encounter".

Like any run of the mill teenage prodigy, Paul built his first computer way back in 1972 when LSI was still a twinkle in Ferranti's eye and you could fry an egg on the power supply. Then off to Leicester Poly to spend some more time building computers and then Lucas Electronics for a five year stint, whiling away his lunch hours playing around with 3D graphics. This soon evolved into the game Encounter.

Mercenary had similar strange origins. It started life as a flight simulator, but Paul wrote such a fast routine for moving over landscapes that it seemed a shame to bog it down with too much performance detail. The adventure side comes from Paul's penchant for text adventures.

What actually pays the bills though is Novaload, the tape loading system developed by Paul for Encounter. It is used on around 70 per cent of all games. Whilst at 31, you could hardly describe Paul as a whizz kid millionaire, the sort of five figure sums Novaload has netted are not to be sneezed at.

Mercenary II? Well, the conversions come next, and at the moment it's very much in the design stage, but it will probably be carrying on where Mercenary left off, out in space, with more depth and solid objects.

N.O.M.A.D

▶ Spectrum • Ocean • Robotics • £7.95 • Simon Beesley

GRAPHICS ●●●●
SOUND ●●
PLAYABILITY ●●●●
VALUE FOR MONEY ●●●●
OVERALL RATING ●●●●



SCREENS

• Nomad — some consolation for Spectrum owners.

Bad news for Spectrum owners. Hewson Consultants are not planning to convert Paradroid — the robot game par excellence — for Z80 based micros; at least, not yet. In the meantime, Ocean's robot game, Nomad, should provide some consolation. Not in the Paradroid class maybe, but more than enough to be going on with.

The plot is straightforward. Guide Nomad, your robot, through the corridors of a man-made asteroid and penetrate its HQ. But it is an afternoon's work just completing the first two of the four sections. Quite apart from the threat of homing missiles and artillery, there is a problem with magnetic walls. Unless you position yourself correctly, you will be stuck — limbs, sensors and blasters flailing.

When you think you have earned a breather, you find yourself out of control, falling into unknown territory: a gravity sink. In the later stages Robothugs make an appearance. They look benign but are in fact wholely vicious.

Controlling Nomad is also a job in itself. The autonomous war-droid has both inertia and — once set in motion — momentum. So manoeuvring it accurately is a difficult task, at first. It is a measure of how playable the game is that you carry on despite the frustration.

Another plus is Nomad's superb graphics. One section bears all the marks of inner city deprivation. There has obviously been rioting here: torn metallic panels, blast-damaged equipment, and graffiti — if you look closely you can even make out the words, "Nomad rules".

MICKEY MOUSE

▶ CBM-64 • US Gold • Educational • £12.95 • Paul Bond

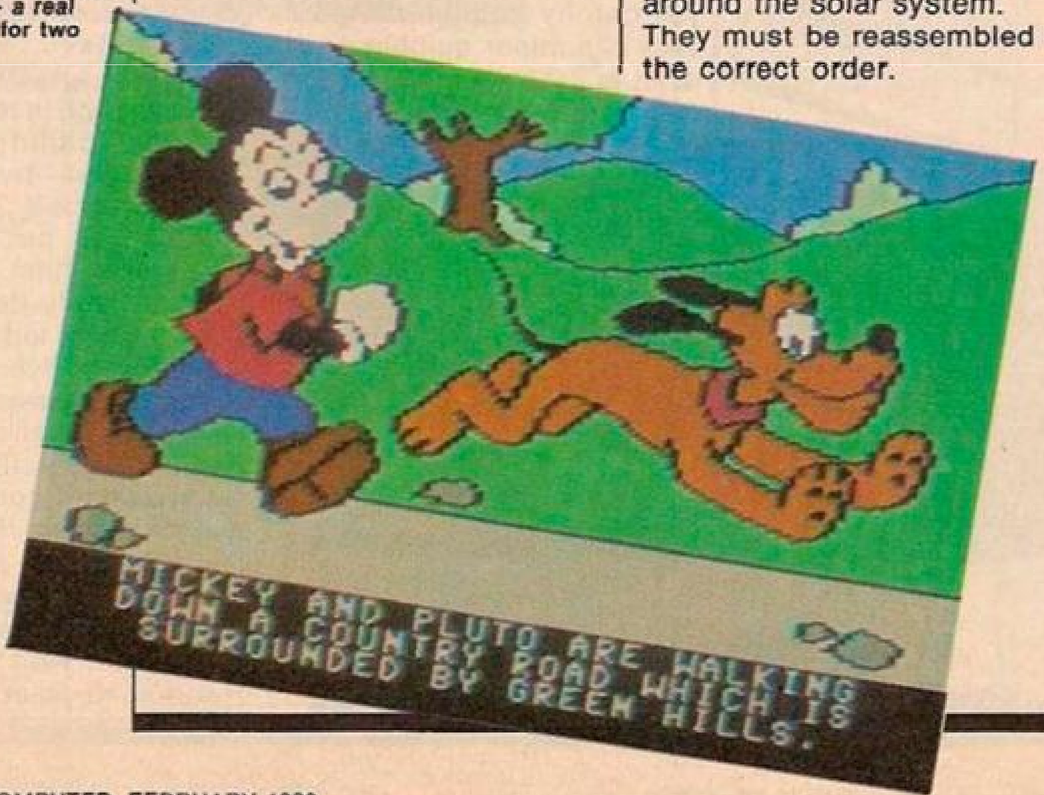
VALUE FOR MONEY ●●●
GRAPHICS ●●●●
PLAYABILITY ●●●●●
SOUND ●●

SCREENS

• Both educational and entertaining — *a real* snip at £12.95 for two discs.

Mickey and Pluto are stooging through the countryside when suddenly they see a flash of blinding light over to the north. Driven by the inexhaustible curiosity of American youth they discover a flying saucer carelessly parked with the door open. Sensing the opportunity for the joyride of the century they stroll in and help themselves to food and find themselves helping out the beleaguered natives of the planet Oron.

As the ship's computer, number XL30 explains, an interplanetary thief has stolen a memory crystal which contains the planet's memories. The bounder has broken it into nine pieces and has left them scattered around the solar system. They must be reassembled in the correct order.



Stock stuff, you may say — so where's the education? The game will certainly convey the information about name and environmental conditions of planets that most eight-year-olds have off pat anyway. The real educational purpose of these Disney games is to condition kids to think in adventures by limiting the number of options you can take. Although I must confess that I didn't know that Pluto, the planet not the dog, stops being the eighth planet out from the sun in 1999. The game works on the same principle as Disney's Winnie-the-Pooh, also available from U.S. Gold. You create two-word commands by chosing words from the screen, one word from each line.

However the game is a real snip at £12.95 for two discs — it's only available in this form, and provided you don't eat your marmalade sandwiches off the software it is to be commended to you and your seven-year-olds — or kids of all ages.

ART STUDIO

▶ *Spectrum ● Rainbird ● Graphics utility ● £14.95 ● Simon Beesley*

With its first two programs, British Telecom's new software label, Rainbird, has got off to a cracking good start. The Music System, which was originally released by Island Logic, is generally acknowledged to be the best music program around; and Rainbird's other re-release, OCP's The Art Studio, can likewise claim to be the best paint and draw program.

The Art Studio relies entirely on pull-down menus and icons. There's no need to flip through the manual for the right key combination. You simply move the pointer to the menu bar at the top, pull down a list of options, and highlight your choice.

If, for example, you select Fill, you have a choice of solid, textured, and wash textured fills; or you can create your own texture. Pick the textured fill option and there is a further menu with 32 available textures. Then it is just a matter of moving a paint roller icon into the shape you want filled.

It is just as well that the program uses pull-down menus, since it offers an exceptionally wide range of features: most of the features, in fact, that you would find in programs for 16-bit micros, like MacPaint — including a spray can, a brush, and a magnify options.

Best of all perhaps, is the Window facility. With this you open a window on any section of the screen. You can then cut and paste, rotate, invert, copy, and flip the window; or even re-scale it so that the contents are compressed or enlarged in any direction.

Both powerful and easy to use, the Art Studio is an exceptional product. Too bad that it is only available, as yet, on the Spectrum. By the standards of the Amstrad, the machine's pixel resolution is limited, and its colour resolution even more so. But then the great thing about the Art Studio is that it pretty soon makes you forget you are working on a Spectrum.

GRAPHICS
●●●●●
VALUE FOR MONEY
●●●●
OVERALL RATING
●●●●●





SCREENS

● Pull down means — no need to thumb through manuals

TRANSFORMERS

▶ CBM-64 ● Ocean ● Arcade Adventure ● Lee Paddon ● £9.95

VALUE FOR MONEY
● ● ● ●
GRAPHICS
● ● ● ●
PLAYABILITY
● ● ● ●
SOUND
● ● ● ● ●
OVERALL RATING
● ● ● ●

SCREENS

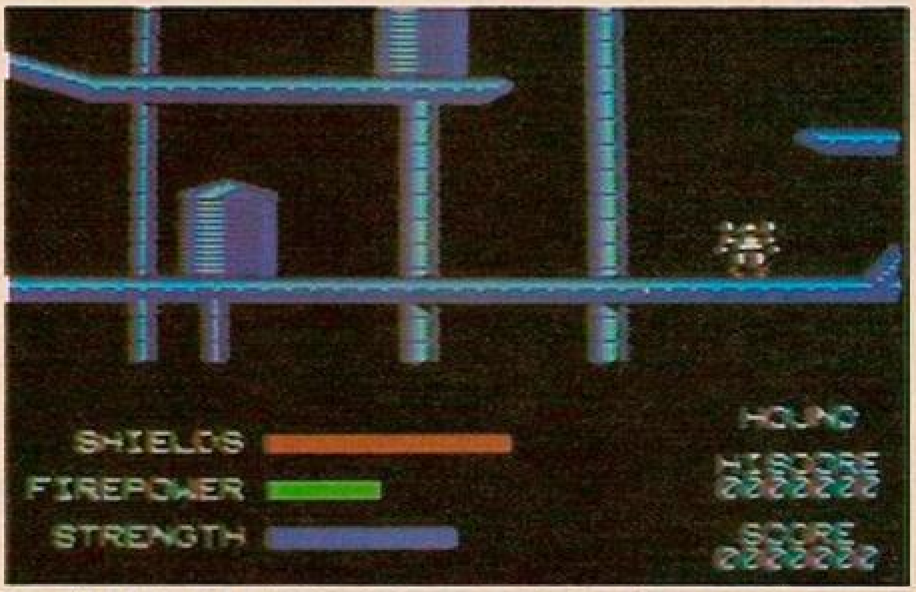
● A simple, stylish game for fans of the TV show.

Yes, its TV tie in time again, with Denton Designs producing the game of the toy of the series.

All your old favourites from the small screen are here. Jazz, Mirage, Bumblebee, Hound, and of course, the local heavy, Optmus. In case you are one of the many millions who has never tuned in to TVam, Transformers is a cartoon strip in which our brave mechanical chums save the world from all sorts of evil threats.

In the game, I'm afraid, there are no worlds to save. The bad guys have done nothing more terrible than nick your logo and scattered it all over a superb multi-level maze. You job is to use your robots to gather up and reassemble the four pieces of the logo, with a bonus based on speed.

What the game lacks in story line, it makes up for in presentation. The sound track



is well up to the standards we expect from Denton after their "Frankies" game. You could almost forgive the Commodore its slow loading if every game had loading music like this.

The maze consists of a series of platforms with ramps between them. The opposition consists of aggressive dogs, birds and other Transformers. The action is fast, smooth and addictive. You can walk or fly, but whilst flying, collision with any part of the maze is fatal. You can also transform into a vehicle. You can't fire, but you can move fast.

This is a simple, stylish game, obviously aimed at the same sort of people who are fans of the toys and TV show.

DEATH WAKE

▶ Spectrum 48K ● Quicksilva ● Shoot-'em-up ● Lee Paddon ● £7.95

GRAPHICS
● ● ●
SOUND
● ●
PLAYABILITY
● ● ●
VALUE FOR MONEY
● ● ●
OVERALL RATING
● ● ●

SCREENS

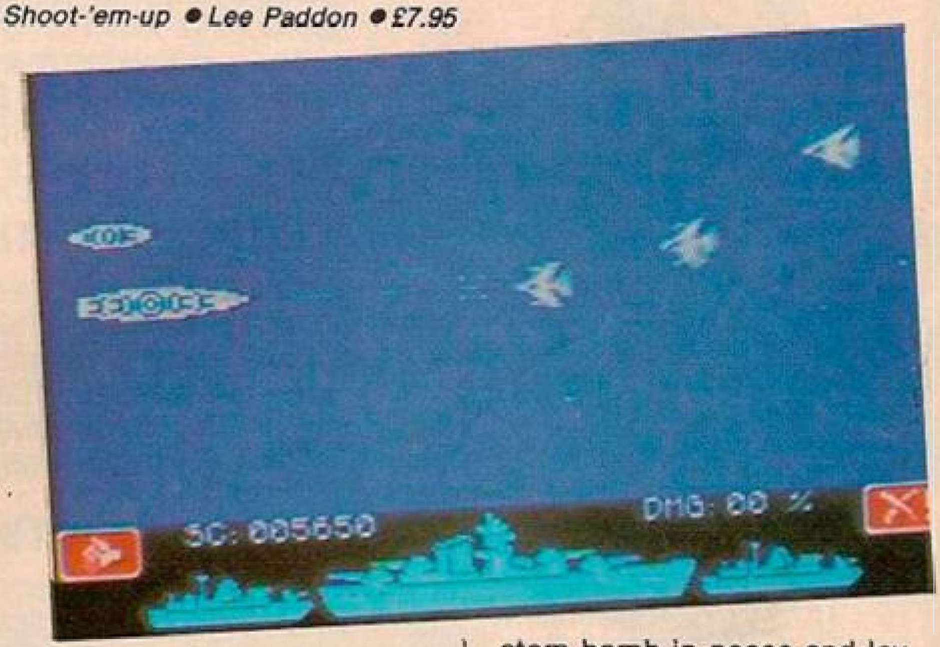
● Takes up where Beach head left off

This is probably the game that Beachhead should have been. Beneath the surface of Beachhead was a series of fairly crude arcade games, but this game has far more detail, and possibly more staying power.

The plot is similar. You have to penetrate a well defended enemy base, being attacked by a variety of threats. Torpedo bombers, torpedo boats, bombers, destroyers, mines and so on. There is also a strategic screen which shows your progress toward your objective, the enemy bunker. On this map you also direct your air support which attempts to suppress the enemy air and sea bases.

Your sole weapon is "The Undaunted", a battleship, plus its two escorting destroyers. Your ships come equipped with flak guns plus heavy armament for shore bombardment.

After successfully completing each arcade sequence, it's back to the strategic map and allocating the air units. In the arcade



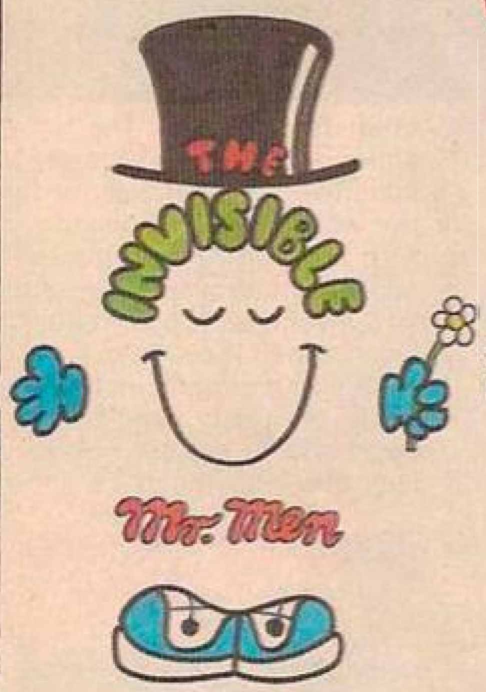
sequences, it pays to be defensive, as the targets are extremely elusive and deadly.

The graphics in the arcade sequences are very nicely done, with simple controls. Particularly nice is the way the torpedo bombers swing their wings back after finishing their attack run — if you haven't splashed them of course.

Needless to say, the fate of the nation is in your hands. Failure means that the enemy can build their atom bomb in peace and lay waste to your cities. Presumably this gives it some kind of historical context, with you attempting to force your way up a Norwegian fjord, but this is not clear. Or perhaps it is a bit of gun boat diplomacy being applied to some dastardly third world chieftain holding the civilised world to freedom. A good, competent game, with plenty of variety. So damn the torpedoes and full speed ahead.

MIRRORSOFT

THE Mr. Men COLLECTION





NEW

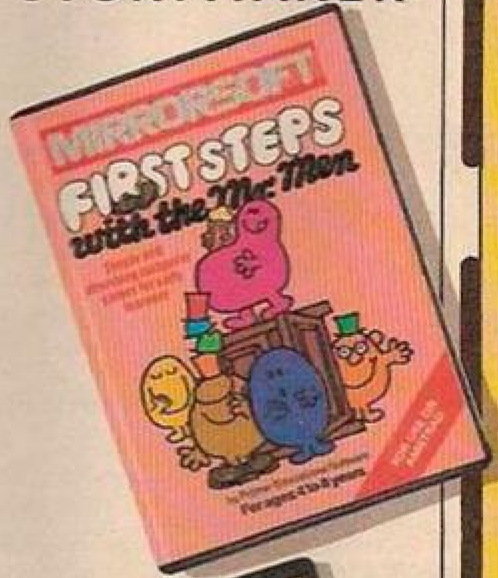
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Cassette £9.95

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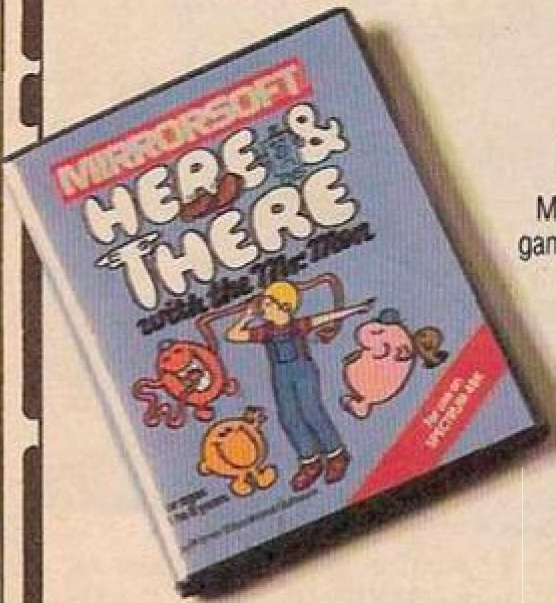
NEW

Three more fun programs from our famous friends: a search-and-find adventure in Mr Men Land, shape and colour matching in Muddletown, and a dot-to-dot game to help learn the alphabet.
Amstrad • BBC B/Electron • Spectrum 48K
Cassette £9.95



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A bumper two-cassette pack featuring Mr Funny, Mr Silly, Mr Noisy, and Mr Bounce. Mr Noisy's Word Game introduces opposites and comparatives, and Read with Mr Bounce helps with positional words like in and out, over and under.
BBC B/Electron • Commodore 64 • Spectrum 48K
Cassette £9.95

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MIRRORSOFT

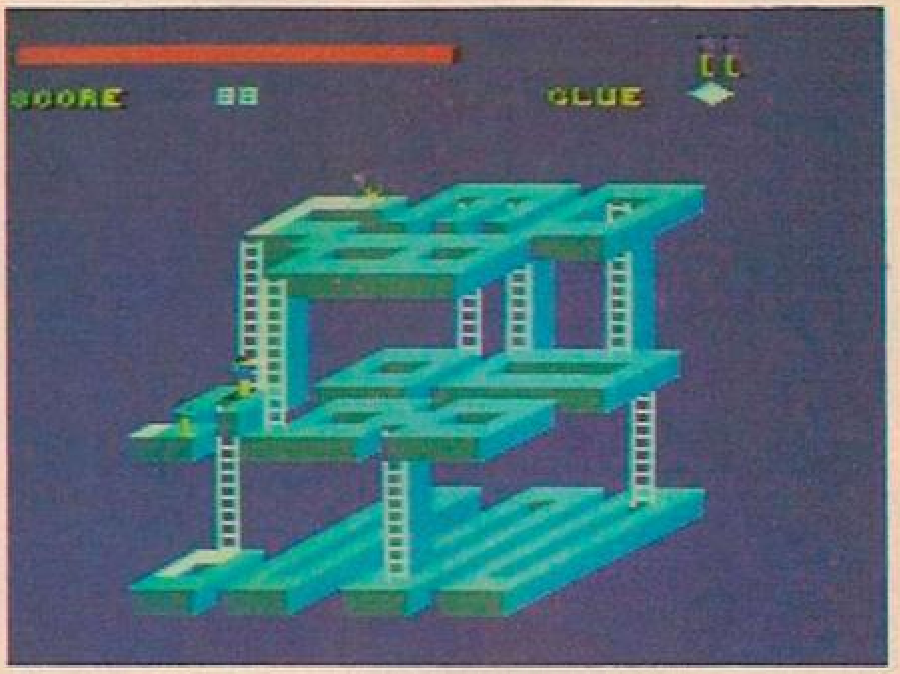
Maxwell House, 74 Worship Street, London EC2A 2EN. Tel: 01-377 4644 (24 hours)
Trade orders: Mirrorsoft Ltd, Purnell Book Centre, Paulton, Bristol BS18 5LQ

HI RISE

► *Amstrad • Bubble Bus • Pacmanesque • £8.95 disc £12.95 tape • Lee Paddon*

VALUE FOR MONEY
●●●●
GRAPHICS
●●●●
PLAYABILITY
●●●●
SOUND
●●●
OVERALL RATING
●●●●

It seems nothing can stop Bubble Bus now. After years in the wilderness, they follow the excellent Starquake with this elegant offering. While a great game, it has the sort of plot that any right thinking games player would baulk at. You play Builder Bob, a nasty piece of work. You are a scab labourer on a building site who is determined to carry on painting despite the picket line. Not unnaturally incensed by this, your workmates decide to beat you up, if they can catch you.



SCREENS

• Hi rise. Nice game shame about the plot.

The practical upshot of all this is that we have a sort of 3D version of Pac man. Instead of power pills, you have two tubes of superglue which you can dump on the scaffolding at strategic points. The glue only lasts for a few seconds, but will stick any striker to it, and also allows you to walk through it without getting any of the GBH you richly deserve. Another way to escape retribution is by jumping off the girders, but be careful there is another girder directly under you. The striker's behaviour varies, some go straight for you, others try to trap you. There are 99 screens of varying complexity. Trying to work out what is going on when your man is behind a pillar is very tricky and you've got to be pretty quick with the glue.

Well, I suppose it's a logical step from this to games featuring police versus pickets, phone tapping and locking out workers. But apart from the story line, this is a fast, addictive game, and 99 screens should keep even the most dedicated dauber happy.

SCALEXTRIC

► *CBM-64 • Leisure Genius • Race game • £9.95 • Lee Paddon*

VALUE FOR MONEY
●●●
GRAPHICS
●●●
PLAYABILITY
●●●●●
SOUND
●●●
OVERALL RATING
●●●●

Pole Position, Talledega, Revs, names for the leather-hat-and-goggles brigade to conjure with. And now another name will have to be added to his hall of fame, Scalextric.

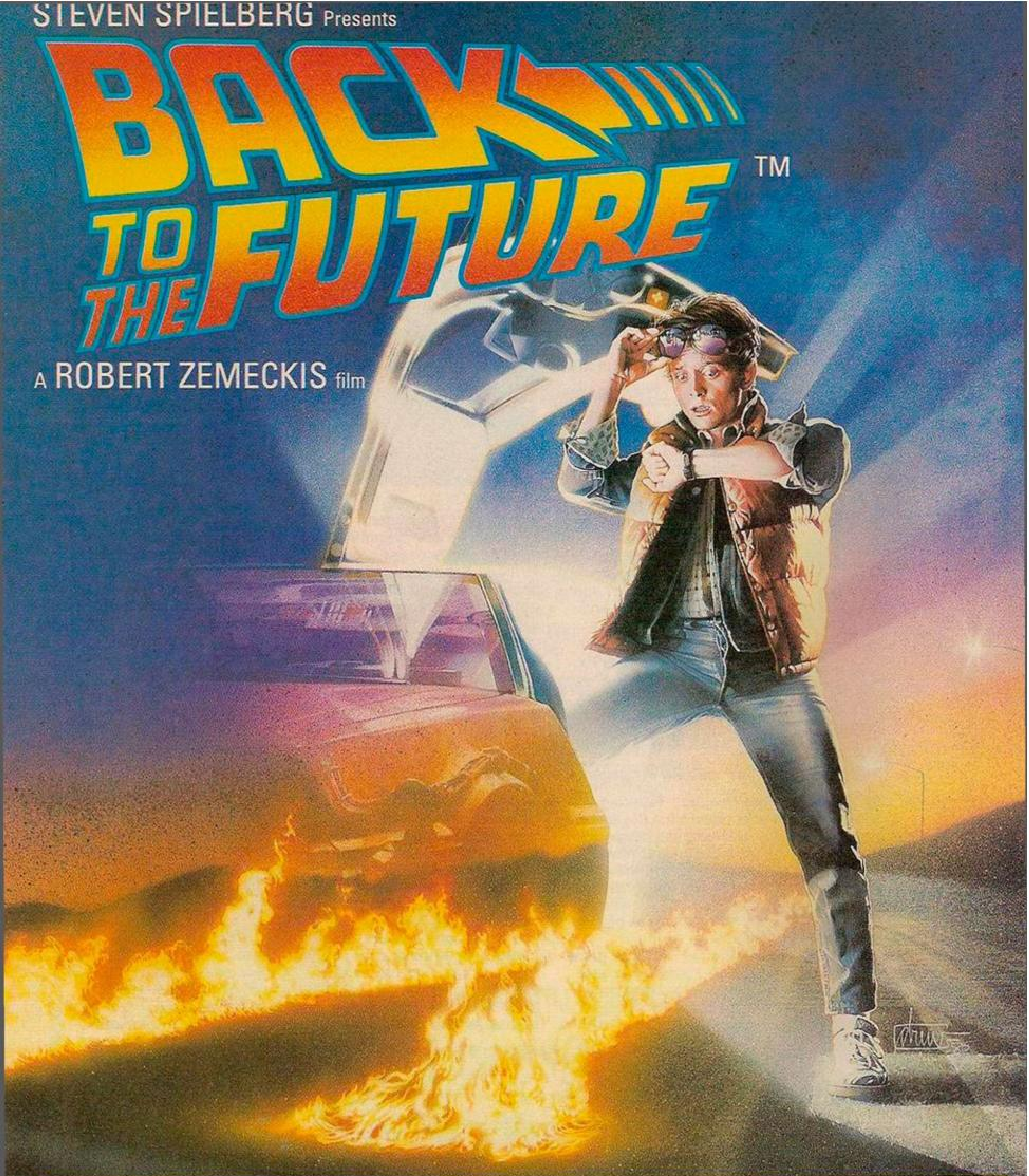
Very reminiscent of Ariolasoft's racing construction set, this game allows two players to race against one another on a track of their own design, or choose from a library of international circuits. However, where this scores is the controls. The over rear wheel perspective will be familiar to all. The over the rear wheel perspective view is clear and effective, the controls consist of steer, accelerate and brake, the gearbox is automatic. If you take a corner too fast, your car will move toward the outside of the track, if you end up on the grass, your speed is curtailed drastically. This makes for a very exciting game, brake too early, your opponent gets away, brake too late, and you won't see him for dust.



SCREENS

• Scalextric, from the living room carpet to the small screen.

When you design your own track, all the standard elements are there, skid chicanes, corners varying from double inners to banked high speed curves. The competitive element is high. If the cars collide, the rear-most car explodes. The cars can try to push one another off the track if level. A neat, simple idea, well implemented. Perhaps a little lacking in variety, and perhaps some more graphic detail might have been nice, or a few computer controlled cars, but still a good addictive game. But some how I miss the important elements of Scalextric, like scrambling around the floor trying to put your car back on the track, or searching for it under the sideboard, ah. memories.



THE COMPUTER PROGRAM FROM

Electric Dreams SOFTWARE

Available on Spectrum 48K Plus, Commodore 64 and Amstrad from Electric Dreams Software 31 Carlton Crescent, Southampton, Hampshire SO1 2EW Tel: (0703) 229694

SOFTWARE SHORTLIST

C

▶ *Spectrum ● Ocean ● Spoof-'em-up ● £7.95 ● Simon Beesley*

GRAPHICS ● ● ● ●
SOUND ● ●
PLAYABILITY ● ●
VALUE FOR MONEY ● ● ●
OVERALL RATING ● ● ●

The whacky title gives the game away. Cosmic Wartoad is clearly intended as a spoof, or perhaps as a grotesque parody of the Star Raiders type game. You start off on the Time Grid, Wartoad's version of a Star Map or Elite's Galactic Chart. Here you select an adjacent Time node for your next port.

Then instead of going on to do gallant combat amid the stars, you end up in a room, facing a Slime Master, or a Sludge Slug, or Frenzied Flies. Somewhat lacking in finesse, these nasties usually come straight for you, and also reproduce once hit. So it is a matter of firing away until such time as the program has judged that you are ready to return to the Time Grid. In other words, this stage of the game presents the simplest sort of shoot-'em-up.

The general idea is to work across the Grid to the Slime King's lair, picking up eight vital items along the way. On the cassette inlay the game is dressed up as a space-time romp, involving Time Paradoxes, Time Vacuums, and the like. However, the major part of the action is shooting nasties.



Wartoad features highly imaginative graphics. The creature you control, a green toad, is a superbly animated eight by eight character supersprite. Windows open up on different game stages; and in between you get a tantalising glimpse of the Slime King's lair.

● Denton Designs go on the toad.

GUN FRIGHT

▶ *Spectrum ● Ultimate ● Shoot'em-up/adventure ● £9.95 ● Bill Bennet*

GRAPHICS ● ● ● ●
SOUND ● ● ●
PLAYABILITY ● ● ● ● ●
VALUE FOR MONEY ● ● ● ●
OVERALL RATING ● ● ● ● ●

In the movie world, 1986 has been hailed as the year of the western. While Pale Rider and Silverado are wowing them on the big screen, Ultimate's Gun Fright is destined for similar success on the computer screen.

As usual in an Ultimate game, the graphics are excellent. Most of the time, the screen is split into a number of areas, to the left of the screen is a colourful "wanted" poster showing a picture of the baddie you have to bring to justice, along with the reward. Beneath that is a display of hats showing how many lives you have left — you start with three.

At the bottom, your score is shown as the amount of dollars bounty earned. Next to this is a graphic display of the number of bullets left in the Sheriff's gun. To the right a telegram window shows the high score, together with the current prices of bullets, horses and fines.

The action window occupies about 40% of the screen.

As Sheriff Quickdraw makes his way around Black Rock, he must avoid bumping into any of the townsfolk, as this results in losing a life, and paying a fine from his score. The score is initialised in a Fast Draw mode screen where shooting at moneybags results in earning money. Quickdraw is also likely to breathe his last if he walks into a cactus.

Quickdraw can speed his travel by riding a pantomime horse, at a cost, but his aim is to hunt out the villain. Once found the screen changes to Fast Draw mode where you see through the sheriff's eyes.

Gun Fright is a witty and welcome change to the wizard-dungeon type of arcade adventure. Yup pardners even Clint Eastwood would approve.



People's Choice

We give a rundown of all-time hits and misses and take a sample of expert opinion about the lucky games that made the grade.

How do you put together a list of the best games of all time? One way would be to select the games which hit the top of the software charts published in magazines every week.

There are several reasons why this approach is flawed. For a start, the charts only started a year or so ago. Second, some charts are misleading because they are compiled by distributors who do not stock the entire range of new releases. Budget software, for example, is often sold outside the normal retail outlets, and, in the past, has not fared as well in the charts as it should have.

There's also the hype factor — one which only really came into its own in 1985. Never before has so much hype been heaped on so many mediocre games.

Instead, *Your Computer* decided to let the games playing public have its say. We hoped that compiling a chart of all-time favourites would weed out the games that hadn't stood the test of time. And in the main, it did — although there were a few raised eyebrows over Ghostbusters' number three position. Around these parts the view was that Ghostbusters has a tremendous soundtrack but is not otherwise very playable.

Our chart can claim to be one of the most authoritative ever published. It is based on nearly 10,000 nominations received from readers. Almost a thousand readers sent in entries, each with 10 nominations for the best games. We typed them all into our BBC Micro and then asked the computer to sort them according to the number of votes received.

As a second measure of popularity the computer assigned each game a score of one to 10 per nomination depending on where it was placed in a reader's entry. In other words, a first place vote earned 10 points and a tenth place, one point.

By and large the two measures agreed: if we had adopted the second method of judging a game's popularity, the final order would only have been slightly different. Knightlore would have come equal first with Way of the Exploding Fist, Elite would have swapped places with Ghostbusters, and several titles would have dropped off the bottom to be replaced by Frank Bruno's Boxing, Jump Jet or Blue Max.

Our final list held over 300 different titles. Other games that just missed making the Top Fifty included — in no special order — Cauldron, Frankie Goes to Hollywood, Sorcery, Falcon Patrol, Frak, Dragontorc, Nodes of Yesod, Solo Flight, Combat Lynx, Castle Quest, Entombed, and Staff of Karnath.

As far as the first 20 games in the list were concerned, there was an impressive amount of agreement. The same titles came up over and over again. The Way of the Exploding Fist was clear winner, while the Top Twenty accounted for 44 per cent of the total votes. In fact the Top Fifty took 69 per cent of the votes. All of which suggests that even if we had received twice as many entries, the chart would not look very different.

Nor does it reveal any bias towards particular machines. Most of the games are available on the Spectrum, Commodore 64, Amstrad, Atari and BBC.

We also took a straw poll on software reviewers' favourite games. You might doubt whether their opinions are more astute than anyone else's But presumably after looking at hundreds of games on a range of different machines, something must have rubbed off on them. Some reviewers even claim that they have developed a nose for quality

(Continued on page 34)









READERS' TOP FIFTY

1	WAY OF THE EXPLODING FIST	MELBOURNE HOUSE
2	KNIGHTLORE	ULTIMATE
3	GHOSTBUSTERS	ACTIVISION
4	ELITE	ACORNSOFT/ FIREBIRD
5	HOBBIT	MELBOURNE HOUSE
6	IMPOSSIBLE MISSION	US GOLD
7	DALEY THOMPSON'S DECATHLON	OCEAN
8	RAID	US GOLD
9	DAMBUSTERS	US GOLD
10	PITSTOP 2	CBS
11	MANIC MINER	SOFTWARE PROJECTS
12	BRUCE LEE	US GOLD
13	JET SET WILLY	SOFTWARE PROJECTS
14	ALIEN 8	ULTIMATE
15	SPY HUNTER	US GOLD
16	INTERNATIONAL SOCCER	COMMODORE
17	HYPER SPORTS	IMAGINE
18	SHADOWFIRE	BEYOND
19	BOULDERDASH	STATESOFT
20	UNDERWURLDE	ULTIMATE
21	POLE POSITION	ATARI
22	TIR NA NOG	GARGOYLE
23	SUMMER GAMES 1	ACTIVISION
24	ZAXXON	US GOLD
25	FIGHTER PILOT	DIGITAL INTEGRATION
26	FOOTBALL MANAGER	ADDICTIVE GAMES
27	PACMAN	ATARI
28	SPY VS SPY	BEYOND
29	JETPAC	ULTIMATE
30	MATCH DAY	OCEAN
31	DUN DARACH	GARLOYLE
32	LORDS OF MIDNIGHT	BEYOND
33	SABREWOLF	ULTIMATE
34	BEACHHEAD	US GOLD
35	ATIC ATAC	ULTIMATE
36	STARION	MELBOURNE HOUSE
37	REVS	ACORNSOFT
38	SKY FOX	ARIOLASOFT
39	VIEW TO A KILL	DOMARK
40	AIRWOLF	ELITE
41	HUNCHBACK	OCEAN
42	EVERYONE'S A WALLY	MICROGEN
43	MATCHPOINT	PSION
44	GREMLINS	ADVENTURE INTERNATIONAL
45	DROPZONE	US GOLD
46	SUMMER GAMES 2	ACTIVISION
47	CHUCKIE EGG	A&F
48	TAPPER	US GOLD
49	GRIDRUNNER	LLAMASOFT
50	SPITFIRE	MIRRORSOFT

REVIEWERS' TOP TWENTY

1	WAY OF THE EXPLODING FIST	MELBOURNE HOUSE
2	BOULDERDASH	STATESOFT
3	DAVID'S MIDNIGHT MAGIC	ARIOLASOFT
4	ALIEN 8	ULTIMATE
5	HIGHWAY ENCOUNTER	VORTEX
6	PARADROID	HEWSON CONSULTANTS
7	GRIDRUNNER	LLAMASOFT
8	ELITE	ACORNSOFT/ FIREBIRD
9	SNAPPER	ACORNSOFT
10	ZALAGA	ACORNSOFT
11	SCRABBLE	PSION
12	LORDS OF MIDNIGHT	BEYOND
13	EASTERN FRONT	ATARI
14	TOMAHAWK	DIGITAL INTEGRATION
15	SORCERY PLUS	AMSOFT
16	QL CHESS	PSION
17	REVS	ACORNSOFT
18	SPEED KING	DIGITAL INTEGRATION
19	MARS PORT	GARGOYLE
20	MISSILE COMMAND	ATARI

DIRTY DOZEN

1 THE GREAT SPACE RACE
2 PEDRO
3 ALCATRAZ HARRY
4 FLIGHT PATH 737
5 BLUE THUNDER
6 JOHNNY REB
7 MAD MARTHA
8 HAMPSTEAD
9 JCB DIGGER
10 SCHIZOIDS
11 ZIP ZAP
12 BRIDGE-IT

People's Choice

(Continued from page 32)

software, which tells them within a few minutes of play whether a game is any good or not.

On the panel were the *Your Computer* team plus Bob Wade and ex-*Your Computer* reviewer Pete Connor. After almost three years solidly reviewing software Bob Wade could probably claim that he's the U.K.'s most experienced games player. The reviewers' Top Twenty, however, undoubtedly shows a strong bias towards games that went down well in the *Your Computer* office. All of them are production stoppers, capable of bringing work to a halt for several days at a time.

Looking at the readers' chart, there are several features that stand out. The first is that only a handful of the top games are straight shoot'em-ups. Evidently the legacy of Space Invaders is now forgotten, alas; aliens are fairly scarce these days. This feature may be some comfort to the author of a recent letter to *Your Computer.*

In the November letters page Harry Seldon — doesn't he figure in Isaac Asimov's Foundation Trilogy? — expressed concern "at the ever increasing popularity of . . . shoot'em-ups". His worry was that we might be upsetting the extraterrestrials who could even now be monitoring us. As our chart shows, his fears are groundless.

Another striking feature of the Top Fifty is that most of the titles are fairly recent, which raises the question whether games software is improving all the time. Obviously the machines are improving as are programming techniques. It takes time to learn how to exploit a machine's potential to the full. For example, there is no comparison between most of today's Spectrum games and those written in 1983.

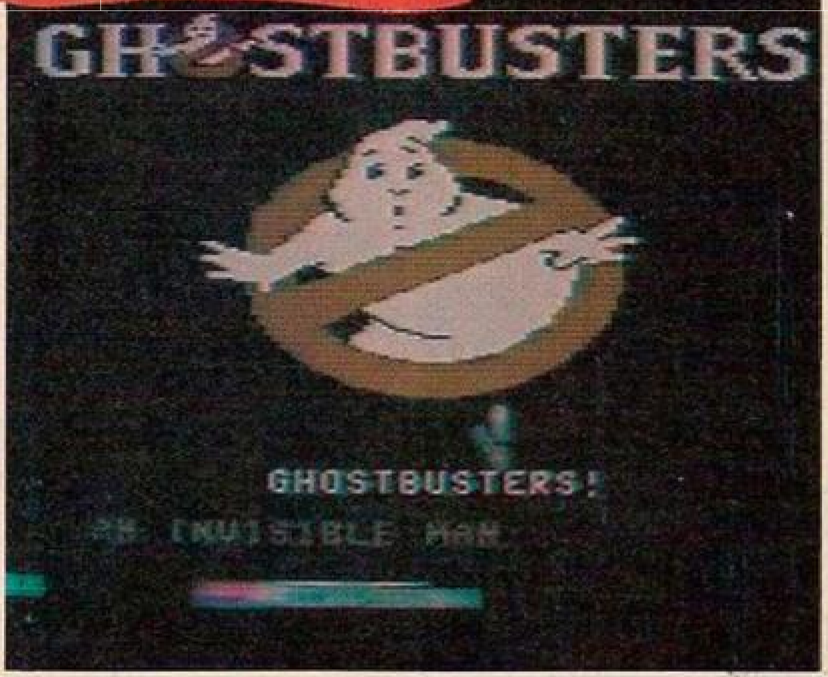
On the other hand, a game can be eminently playable even if it doesn't have amazing graphics, supersmooth scrolling, and 256 screens. Although Gridrunner was written in 1982, it can still hold its own against most new releases, and the best version of this classic game runs on the Vic-20.

To take a more extreme example, two of our reviewers' panel nominated Snake from Computer Concepts. Also dating from 1982, it was a very superior snake game written in BBC Basic.

Possibly the main difference between old and new software is that today's chart-topper is likely to have been written by a team of programmers, graphic designers and someone to compose the soundtrack. Formerly it just took a single programmer. Yes, they were giants in those days. But more on this subject later.

It is also noticeable that nearly half the Top Twenty titles were written in the U.S. In fact U.S. Gold takes the prize for the company with most titles, closely followed by Ultimate. This should please the former editor of *Practical Computing*, Jack Schofield.

Look who's bustin' in at Number 3!





US Gold makes a Beachhead at Number 34

In the introduction to his list of all-time winners, in January 1985, he had a go at Spectrum owners for being insular: "Most Spectrum games players are protected by a happy ignorance of all that has gone before. They missed out on the five years of continuous and intense development that preceded the launch of their machine. Hence they are able to greet each improved game as a breakthrough, mindless of the fact that it has nearly all been done before."

Ouch! But is it fair? It is true the Americans had a head start. The British — and with Melbourne House, Australian — software industry didn't get off the ground until the Spectrum arrived in late 1983. But there are some areas where the home-grown products reign supreme, particularly graphic adventures, platform games and arcade adventures.

Knightlore, Lords of Midnight and Manic Miner are good examples. Their graphics are more imaginative and the ideas behind them are original. Don't let anyone tell you that Manic Miner is merely a development of Miner 2049er.

If you turn to the reviewers' Top Twenty you will see their choices differ substantially from the readers' list. Ghostbusters is conspicuously absent; Paradroid and Highway Encounter were released after we held our survey, and would almost certainly figure in the Top Twenty now; David's Midnight Magic probably never got the right exposure in Britain, although it went to the top of the charts in the States.

Boulderdash which just scraped into the readers' Top Twenty is the critics' choice for number two. It has been called a programmer's program — programmers, at least, are said to admire it. You could describe it as a game for connoisseurs.

But how are we to explain Gridrunner, Zalaga and Snapper, vintage software dating as far back as 1982? Perhaps as an attempt by veteran reviewers to recover their first flush of enthusiasm. These are men who cut their teeth on bat'n'ball games and ZX-81 Hangman. A games reviewer's career is necessarily a short one. The reflexes go after a few years, and the best an old reviewer can hope for is a batch of educational software. So we should see the inclusion of these titles as an exercise in nostalgia.

Unless, of course, some of the early games were just as good as the recent ones. There are quite a few people who think that the best game of all time is Atari's Star Raiders — among them, Jeff Minter and Jack Schofield. Amazingly, it was first written in 8K for an Atari games console in 1979.

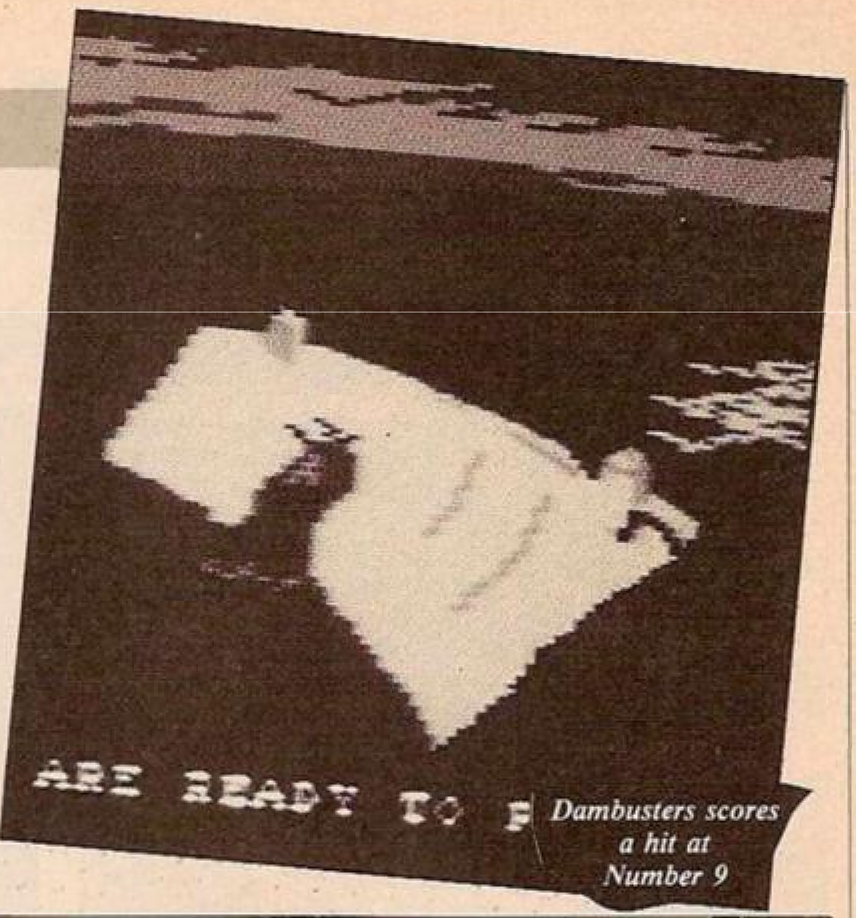
Since the home micro version fully exploits the power of the Atari's graphics chip, Antic, Star Raiders has never been successfully translated to other machines. Yet you can see its

influence in dozens of later games such as Time Gate, Codename MAT and Elite. And it is arguable that of its type it has never been bettered.

Of course trying to agree on the best game of all time is bound to fail, just as the similar attempt to define the ingredients of an addictive game is usually fruitless. One theory has it that a successful game should have a "learning curve" in the form of a parabola.

In other words, it should be easy to play at first, and then become increasingly more difficult, thus providing a challenge. Or you can reverse the theory and claim that a game needs to be frustratingly difficult up to the the point where you master the right technique — like blowing up a balloon.

Either way, the theory collapses in the face of numerous counter-examples. You can't always explain what makes a game playable — its grab factor — although it is obviously the most important feature. A game may have pretty graphics, and a great sound track, but if it doesn't force you to say "just one more go" when someone else approaches the keyboard, then it is probably just not worth playing. ●



Dambusters scores a hit at Number 9

The Dirty Dozen

In June 1985 as part of a competition, we invited *Your Computer* readers to name the five worst programs they had ever paid money for. Our idea was that we would be able to draw up a definitive list of the great software disasters of our time.

As it turned out, there was almost no agreement on what was good and what was bad. No two entries shared more than one title. Some people even nominated such chart-toppers as Ghostbusters, Harrier Attack, and Jeff Minter's Gridrunner — in our book one of the all-time greats.

When you think about it, this lack of consensus makes sense. A good piece of games software is usually recognisable as such within half an hour's play and as a result gains a reputation. But a software disaster sinks without a trace. Only the few unfortunates who have been suckered into buying it get to know just how bad it is.

The worst game, of course, is the one that is so bugged it doesn't even run properly. But up to that point there is almost no limit to the different ways a game can fail. How about a version of Breakout where the bat moves too slowly to catch up with the ball? Or a Pontoon program that doesn't recognise pontoon? These two were part of Neme Software's Games Package for the Vic-20 back in June 1982. Our reviewer felt so strongly about the package, he thought it ought to carry the warning "Keep Clear".

Just as bad was Specman, a Basic version of Pacman for the Spectrum, put out by Jega Software in early 1983. Our reviewer said that it was dismally slow, and added: "Sometimes the ghosts seem to be stricken with paralysis and unwilling to take up the chase." Still, it can't have been as dire as the version of Space Invaders we received from a reader. Accurately titled Space Invader it only managed to field one solitary alien.

What these games had in common is that they were produced when the Vic and Spectrum were in their infancy. At that time you could get away with selling any old rubbish. Today's software is generally far superior.

The Dirty Dozen list given here should be taken with a pinch of salt. Some of the games are victims of a backlash against hype: people are often unduly severe on a game if it has been hyped up and then falls short of expectations. This is probably the reason why readers have awarded Legend's The Great Space Race the title of worst-ever game.

For a start, Legend's previous game, Valhalla, was grossly overrated. The British Micro-computing Awards sponsored by the *Sunday Times* even made it game of the year. But what can you expect from a body that later made the QL machine of the year?

Then Legend foolishly announced The Great Space Race months in advance, with the claim that it would represent the next stage in games software. A prolonged advertising campaign followed. When the game finally arrived, it turned out to be about as novel as a wet autumn. To add insult to injury it was partly written in Basic and over-priced at £14. The punters were understandably enraged.

On a smaller scale Acornsoft's JCB Digger suffered the same fate. BBC owners had been led to expect something special particularly since the program's author had previously written Snapper, possibly the best version of Pacman on a home micro. In fact, JCB Digger is not spectacularly bad, just not very playable.

Hampstead is rather different in that it won glowing reviews from magazine critics when it should have been panned. The game is about working your way up the social scale from a council flat in South London to the good life in Hampstead. Ill-informed writers in Sunday colour supplements tended to recommend it as an example of a whacky and sophisticated adventure game. But in truth it is patronising and unfunny.

You may be surprised to learn that two other titles in the list, Schizoids and Zip Zap, came from Imagine, a company responsible for some of the best games of 1983/84. However, they date from the period when Imagine's production line was churning out programs at a rate of almost one a week.

As for the rest, there are some — it must be admitted — that are truly bad. To quote another *Your Computer* review, you can say of them that they weren't so much released as allowed to escape.

We shall refrain from identifying them by name. Their authors know who the are.

All the Dirty Dozen won at least three but not more than 10 votes each. A further 200 or so games received one or two nominations. Some of them may be familiar to you: Airwolf, Arcadia, Everest Ascent, Transylvanian Towers, Roland on the Run, 3D Tunnel, Android 1, Graham Gooch's Cricket, Micro Olympics, Dukes of Hazard.

Strangely enough, Airwolf along with Blue Thunder, and the chart-toppers mentioned earlier, also appeared in the readers' top 100. The moral here seems to be that, as far as these games are concerned, one man's meat is another man's poison. ●

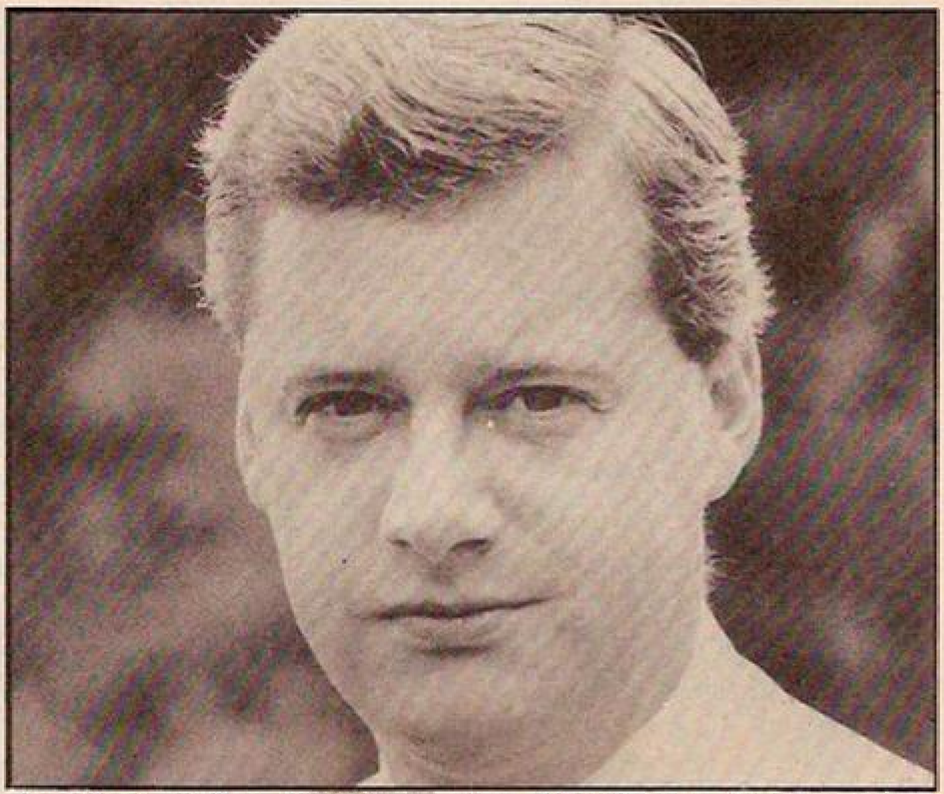
Voices' choices

BRUCE EVERISS

When Bruce Everiss was one of the big boys at Imagine the company had a reputation for large sales and even larger hype for very average products. So it's no surprise that he says "if you go for bestsellers you come up with a load of junk".
But have the courage of your convictions — name names.

"Ghostbusters is a joke," drawls the Everiss in his dry Liverpudlian way. "All you've got to do now to get in the charts is release some sort of sports simulator." Alone among all the pundits, readers and computer journalists we consulted Bruce was the only one to suggest that any of the original Imagine programs deserved to be in a chart — well, except Schizoids which won a few votes in the worst-ever poll.

But even he did not have the audacity to put Wetzone from Bruce Everiss Software (no relation) in his top ten. U.S. Gold's products don't impress Bruce either. "This American stuff — you can stuff it." Although he didn't rate them a chart mention he reckons Odin "out Ultimate Ultimate" and he believes that unless the hermits from Ashby de la Zouche leave their cave soon the world will pass them by.



For sheer quality Beyond impresses him most, both with Mike Singleton games like Lords of Midnight and productions like Shadowfire and The Tuner from Denton Design, now the home of another Imagine refugee, programmer John Gibson.

BILL STEELEY

When you strip the tacky U.S. Gold label off simulators like F-15, Strike Eagle and Solo Flight you'll find the Microprose logo. Peel off the logo and you just might see the mouth of Bill Steeley — Microprose's gung-ho chief. His company is based in Maryland but if he catches you whistling the State anthem he'll probably have you shot for being some kinda commie.

He is amicable, over-bearing and positively sweats self-confidence. He doesn't so much talk to you as surround and then bombard you. Ten minutes on the telephone to Microprose is like going ten rounds with a Sumo wrestler in a bowl of warm treacle. Even having the temerity to suggest that he might put programs from other software houses in his top ten takes nerve.

In the end Bill hands over to Sid Mier, his top programmer who wrote F-15, after explaining that he set up Microprose because no-one else was producing good enough programs. Sid proves to be far more generous to his fellow programmers. Of course Kennedy Approach, Solo Flight and F-15 are in there — deservedly — but so are Electronic Arts' version of Hammurabi — Mule, Chris Crawford's Eastern Front and, just to prove Sid isn't obsessed by simulations, Pole Position and Galaxians. Also in there is Silent Service, a submarine simulator from Microprose that sold 40,000 copies in the first month Stateside but hasn't crossed the Atlantic yet. The company is also about to produce Conflict in Vietnam which sounds like another Rambo style attempt to rewrite history so that the Yanks won, but at least there is an option to be the Vietcong.

Microprose is excited by the new wave of machines — Amiga, Mac and Atari ST — and Bill expects to produce simulators that are "another order of magnitude" better than existing titles. But Sid is not rushing to produce "the very first Pacman" on the Amiga. It will take time to develop proper software and in the meantime the Commodore 64 has plenty more life. Microprose will renew its battle with Digital Integration which led to F-15 dogfighting it out with Fighter Pilot. Bill Steeley hopes to launch Gunship — a helicopter simulator based on the Apache — next April, by which time DI should have the Commodore 64 version of Tomahawk flying.

JEFF MINTER

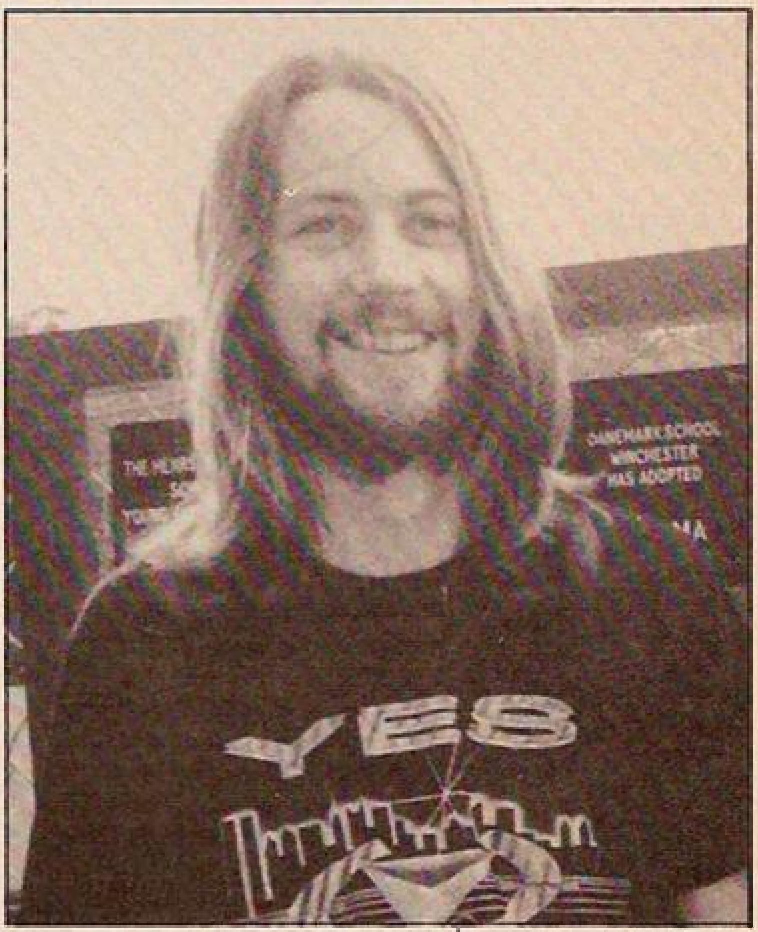
Jeff Minter describes himself as "just an old-fashioned blaster" and he is confident that the day of the shoot 'em-up will return. He instances examples from the arcades — like Taito's Invaders Return where improved graphics and a few little surprises can re-invigorate the old favourites.

At the same time his love of the moment is the Atari 520 ST for which he has produced Psychedelia and Colour Space. Every evening he and his would-be hippy mates sit around playing with shapes and colours on the screen. "It's very difficult to describe in legal terms," says Jeff, playing up to his long-haired image. "It really does damage people's brains."

Trying to confine the Minter to a list of ten eligible computer games is almost impossible. How about Invaders Return? he wants to know. "You can't have it because it is only in the arcades," we explain. Psychedelia and Colour Space? "Yes." On the ST? "No, you haven't released it yet." Millipede? "O.K." On the Atari VCS? "Certainly not." But it's sheer megablast. "The answer's still No." And so it goes on...

Reluctantly Minter starts his list: Batalyx, Fractalus, Star Raiders, Sheep in Space — "I'm still deeply attached to Sheep", Master of the Lamps — "It's so psychedelic", Revenge of the Mutant Camels, Dropzone, Who Dares Wins — "Shooting up little men is distasteful" so Minter would rather they were amorphous blobs, Hitchhikers Guide — "I'm still trying to get to the end of that", Encounter. But Minter is unhappy that he has not mentioned enough golden oldies.

· Minter starts enthusing about Missile Command at the drop of a hat — well, missile maybe — but, unlike some of the gung-ho American games writers, he doesn't confuse fact and fantasy. Knocking spots off the screen is fun but knocking holes in real people is right out of order. "It's a shame that games like that have gone out of fashion," he mourns when he thinks of his earlier games. You won't find him still playing his ZX-80/81 originals but he stands by the programs he wrote for the Vic-20 as good by any standards — and he says that with an Atari ST sitting on his desk. "I did like Gridrunner on the Vic-20", (despite the superior graphics of the 64 he prefers the raunchy feel of the 3.5K version) "and the sound effects I did for Laserzone on that machine are still my



favourite — I miss the Vic in many ways." Like many other programmers Minter admires Ultimate for their technical expertise but thinks that the finished games lack a little something. "They're always extremely pretty and well programmed but there's not much humanity in them." "Is there much humanity in Revenge of the Mutant Camels," we venture. Minter is offended. "There's a lot of me in that."

DAVE MARSHALL

When you hear the guys from the air industry's magazine *Flight* enthusing about the latest helicopter simulator they have tried you can be sure they are talking about a multi-million dollar mainframe-controlled unit somewhere in Seattle. But listen carefully — at the moment it is Digital Integration's Tomahawk simulator for the Spectrum based on the Apache attack helicopter that has won their respect.

No wonder, because DI's Dave Marshall, already famous for his Fighter Pilot F-15 flight simulator, spent 18 months working with Apache makers Hughes/McDonnell Douglas to get it right. "Modesty apart," says Dave, "other flight simulators are definitely inferior."

So why are Tomahawk and Fighter Pilot not in Digital's all-time top 10? "You can read other people's top tens and they always put their own programs at the top — we thought 'what the hell'." DI's "democratic" chart is compiled from the individual lists of in-house programmers Nick, Colin, Tim and Rod Swift who showed self-interest by putting his Speed King top. Now Rod is working on another bike game — the long promised TT Racer which "will be more of a race simulator based on Suzuki's Project 500 — the whole screen banks as you go round a corner as if you mounted a camera on the fairing — than just another Pole Position".

Hot Shots

BBC POKES

Frak
*LOAD "FRAK2":?&305B=&FF then CALL&468A

Mr E
*LOAD "MAIN PROGRAM" 1900 then enter &IECB=&EA then use CALL &4300 to start game.

Zalaga
*LOAD "ZALAGA 3",Then ?&301B=&FF and CALL &4522.

Rocket Raid
Enter CHAIN"" to load game. Lose your first two men then when the third appears press Break. Enter MODE 2 followed by CALL TOP to continue.

AMSTRAD POKES

Roland in Time
Enter MEMORY 4999: LOAD "ROUTINE",5000 After program has loaded type POKE 5859,67 for Green screen for colour type also POKE 5001,0. To start game type call 5000

Electro Freddy
Type in then run program

```
10 MEMORY 10000
20 LOAD "A1"
30 LOAD "A2"
40 LOAD "A3"
50 LOAD "A4"
60 LOAD "A5"
70 POKE 39356,255
80 CALL 39323,255 is the number of
   lives
```

Punchy
Type in then run program

```
10 MEMORY &1FFF
20 LOAD "CODE"
30 POKE &20A9,255
40 CALL &2000
```

Roland on the Ropes
Type in then run program

```
10 MEMORY 4800
20 LOAD "ROLAND.D"
30 LOAD "ROLAND.C"
35 INK 0,1: INK 1,24: INK 2,20:
   INK 3,6
40 POKE 25804,0:
   POKE 25562,0
50 CALL 41100
```

CBM-64 POKES

Attack of the Mutant Camels
On slow loader side insert LINE 0 POKE 11639,255 in the header

China Miner
1. Type Verify to get an error message
2. ENTER LOAD "",1,1 to load first part
3. Repeat this to load second part
4. ENTER SYS 64738 POKE 32776,0: POKE 33320, (No 0-29) Depending on which screen you wish to start.
5. Start game by typing SYS 33127

Frak
For inf/lives *Load Frak 2
?&305B=&FF
CALL&468A
To Boot into different screens using escape key *LOAD Frak 2
?&304D=1
CALL&468A

Motor Mania
TYPE in "VERIFY" (Ret);LOAD"",1,1 (Ret and Play) Poke 8646,255 (Ret); SYS 8000 (Ret)

Blagger	POKE 3560,8
Fort Apocalypse	POKE 36339,153
Frogger	POKE 22341,173
Hard Hat Mach	POKE 16877,173
Hunchback	POKE 9521,234: POKE 9522,234: POKE 9523,234
Moon Buggy	POKE 24151,173
Neptune's Daughters	POKE 7870,255
Pooyan	POKE 20634,173
Snokie	POKE 33242,55

Zaxxon
Type in "Red" at the start of Program to enter the Cheat Mode and become immortal.

Frank Bruno
Boxer 1: NO CODE
CANADIAN CRUSHER: He is very easy to beat. Just throw in body blows until his guard is down and then give him lots of blows to the head for as long as you can. Watch out for the bearhug when he gets back up.
Boxer 2: Code — OC71008A7 Name used — EDD
FLING LONG CHOP: Watch out for his speciality — the fly kick. Whenever he bends down on his knees duck. To beat him just give him head blows and body blows.
Boxer 3: Code — C6B1006N5 Name used — EDD
ANDRA PUNCHEREDOV: His speciality is the head butt. This must be one of the most difficult moves to overcome. Do left and right head blows and then duck. When he dodges left do a left head blow and when he dodges right do a right head blow.
Boxer 4: Code — IA5INFEN5 Name used — EDD
TRIBAL TROUBLE: His speciality is the double fisted punch. The only warning you get for this is when he stands still with his guard up. Give him a body blow to get his guard down and then give him as many head blows as possible.
Boxer 5: Code — 049INCCN5 Name used — EDD
FRENCHIE: His speciality is a spinning fist punch. When his fist starts spinning stop whatever you are doing. When it stops spinning duck. Lure Frenchie's guard down by giving him a right body blow and following it with head punches. Repeat this until you get him down three times.
Boxer 6: Code — C7CILFALA Name used — EDD
RAVIOLI MAFIOSI: Ravioli is really tough. The best tactics are to punch left to the head and then dodge, punch right to the head and then dodge and so on. When he does his speciality dodge and then try to get a right head blow in.

COMPETITION Back to the Future



COMPETITION RULES

- The winners of the competition will be the people who, in the view of the editor, come up with the correct answers to the questions and the most interesting or amusing tiebreaker.
- The names of the winners will be printed in the April issue of *Your Computer.*
- All entries must arrive at the *Your Computer* offices by the last working day in February 1986.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Focus Investments or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- Focus Investments assumes no responsibility or liability for any complaints arising from this competition.

WIN a £100 worth of cinema ticket vouchers as first prize, plus a copy of Electric Dreams' game. Back to the future.

There are a further 50 copies of the game for the runners up.

To be in the running for one of the prizes, first answer the following five questions:

1 Who directed the film Back to the Future?
2. What speed did the car have to reach before you could travel back in time?
3. What was the name of Marty's girlfriend?
4. What date does Marty travel back in time to?
5. What is the name of the band which performs at the school dance?

Now, for the tiebreaker, tell us: Which famous historical person would you like to visit, and what single question would you put to them?
Be sure to enclose the coupon with your entry.

BACK TO THE FUTURE COMPETITION

Don't forget to enclose this coupon, or a photocopy of it, when you send in your entry to Back to the Future Competition, *Your Computer*, Suite 4, 20-22 York Way, London N1.

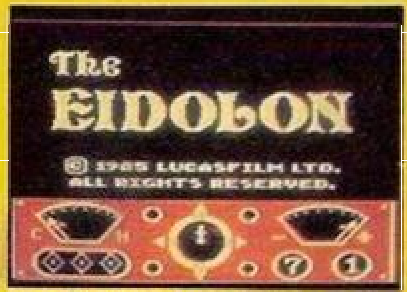
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Stand by fo

In which P



The Eidolon is a strange device invented by Dr Agon.



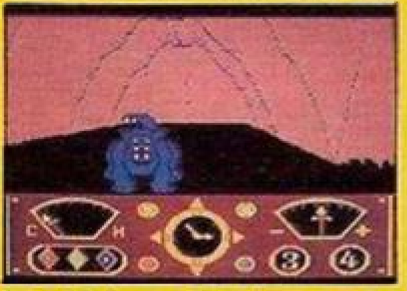
It takes you into the human id peopled by stone dragons.



These come to life when you energise them with fireballs



A Grep aghast. The right mix of fireballs will kill monsters

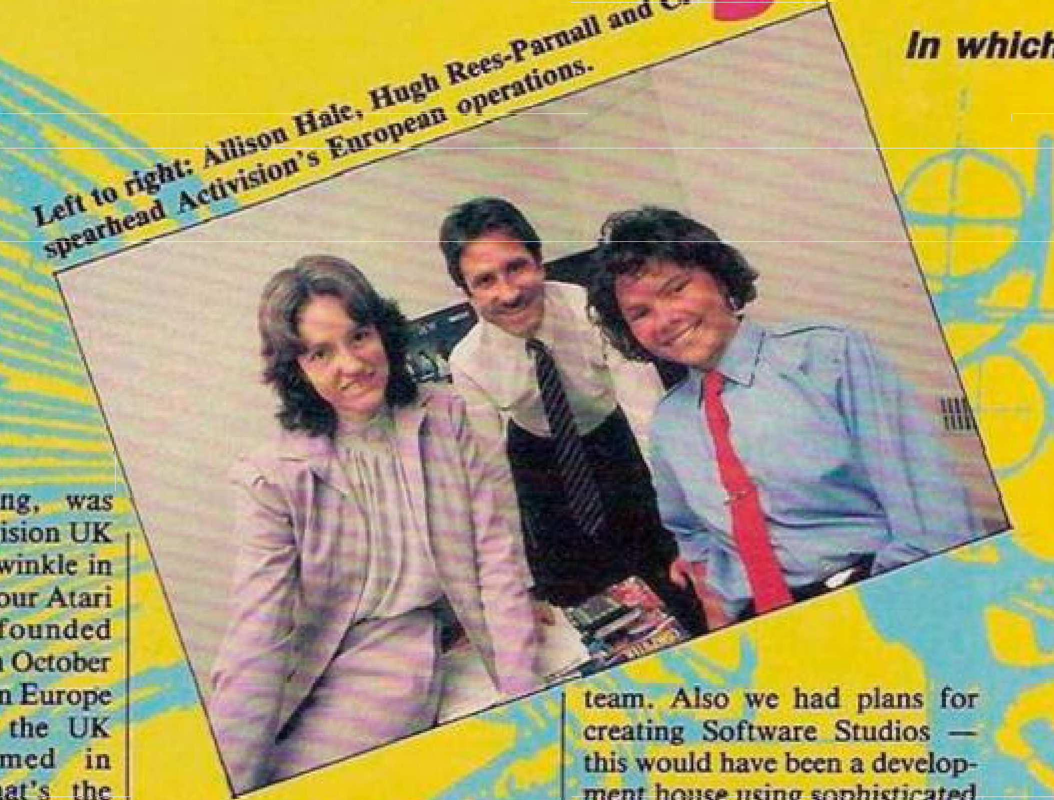


The Maloc, or hell-hound. Not a pedigree chum.



Two heads are better than one. Some of them have seven.

Left to right: Allison Hale, Hugh Rees-Parnall and Clare Hirsch spearhead Activision's European operations.



In the beginning, was VCS, and Activision UK wasn't even a twinkle in the eyes of the four Atari renegades who founded American Activision in October 1979. But you can't run Europe from California, so the UK company was formed in December 1982. What's the difference between the UK and the Californian gamester — apart from about eight hours?

"In the US it's very techie-orientated; flight simulators, fantasy role-playing games, text adventures, Zargon chess — Hacker is a very successful game in the States," says Activision's American chief Greg Fischbach." The UK market seems to be characterised by things like Rambo, Commando, Ballblazer — the two markets are very dissimilar."

Nevertheless, Activision's Ghostbusters clocked up over half-a-million sales in the UK alone; with the release of the video version of the movie the computer game is getting a new lease of life. But are Activision UK one-hit wonders? This Christmas's releases, Hacker and Little Computer People Discovery Kit, don't have as high a profile as Ghostbusters.

"Little Computer People is probably the highest selling entertainment disc" protests Hugh Rees-Parnall, managing director Activision UK. But one feels that the LCP disc is a uniquely American product and a real example of the divergence of US and Anglo tastes.

Activision are now keen to encourage contributions from the natives. Countdown to Meltdown was a brilliant three-dimensional game of British origin and the company hope to encourage more of the same via the foundation of their Electric Dreams label (not to be confused with US Gold's label of the same name).

Both Rees-Parnell and ex-Quicksilva supremo Rod Cousens are keen to promote Electric Dreams as an umbrella for beleaguered independents.

"Activision can provide worldwide market support, even in the States," enthuses Rod Cousens; "no other software house can provide that. Electric Dreams is not going to be just another software house producing platform game after platform game. Programmers will be able to express their talent without fear of dilution."

Back To The Future seems a good example of the approach. Activision's good fortune with Ghostbusters meant that Universal Pictures looked kindly on their application for the game rights to the movie. And Mark Eyles, another Quicksilva refugee, has taken care to develop a strong game in its own right.

Eye of the Mask by Sandy White of the Ant Attack fame is to Electric Dreams a measurement of what you can get out of the Spectrum when everyone says it's reached its limits. "That to me is the thrill of the industry" beams Rod Cousens. Rod Cousens is keen to emphasise that the ex-Quicksilva people come to him, rather than the other way about" When Argus Press Group took over Quicksilva, I don't think they appreciated that a software house is not just a name, it's a team. Also we had plans for creating Software Studios — this would have been a development house using sophisticated equipment to produce new standards of software. I think Argus shelved that. I see Electric Dreams as taking all the strengths of the old Quicksilva and, well, just carrying on."

Naturally cagey about future projects, Rod Cousens promises "real-life simulations" and about three licensed games based on TV, film or pop sources every year. How about a computer soap? "It's a possibility, but I can't be too specific."

Back in the hell-hole Andrew Wright and a couple of play-testers are getting to grips with the next Activision beast to be unleashed on the UK market — The Eidolon.

"I call it the hell-hole, people will sit down here and play a game non-stop for 12 hours sometimes," says Andrew who first got involved with Activision as a Video Cartridge System (VCS) demonstrator at Hamleys. "Because I knew the cartridge versions of the games back to front, I could check out the cassette versions for different home computers." Currently at the dizzy height (and rising) of Product Review Co-ordinator (Europe) it's his job to look for acquisitions and organise the play-testing.

The Eidolon is a strange machine invented by Dr Agon in the 1890's. It allows you to explore the murky depths of the human id, peopled by strange creatures: Rotoflies, trolls, Biter Birds, Greps, Dragons and the

…r Activision

…ul Bond examines his id and dreams Electric Dreams

ferocious Maloc or hell-hound. "That gave us a bit of a shock when we first saw it. It wasn't mentioned in the notes from Activision, and you can imagine late at night when you've got really into the game and suddenly things start appearing that to all intents and purposes aren't supposed to be there — it can be a bit scary."

"Ever seen the alien in Fractalus?" asks one of the two budding programmers, Martyn Bysh and John Davy — they are on a work placement scheme from Walthamstow ITEC — "It comes as a bit of a shock if you aren't ready for it."

As you move through the caverns you need to fire different amounts of fireballs in different combinations to destroy or mutate the attacking creatures. "As well as being an adventure, it's a massive logic problem". Quite apart from the traumas of being chased down a network of tunnels by a Maloc late at night.

With the acqusition of Creativity Software in the States Activision show signs of diversifying from dragons and sports into utility software — not as dull as it may sound.

Gamemaker is an ingenious game designer for the Commodore 64. Comprising a Scene Maker, a Sprite Maker, a Sound Maker, and a Music Maker, it can provide all the nice touches you need to design your own arcade games.

Written by Gary Kitchen, who did EDC's Designer's Pencil, it features pull-down menus and all those Macintosh-style touches that every computer owner envies. And if that doesn't whet your appetite, several games designed using the Gamemaker, including Chopper by John van Ryzin, are thrown in.

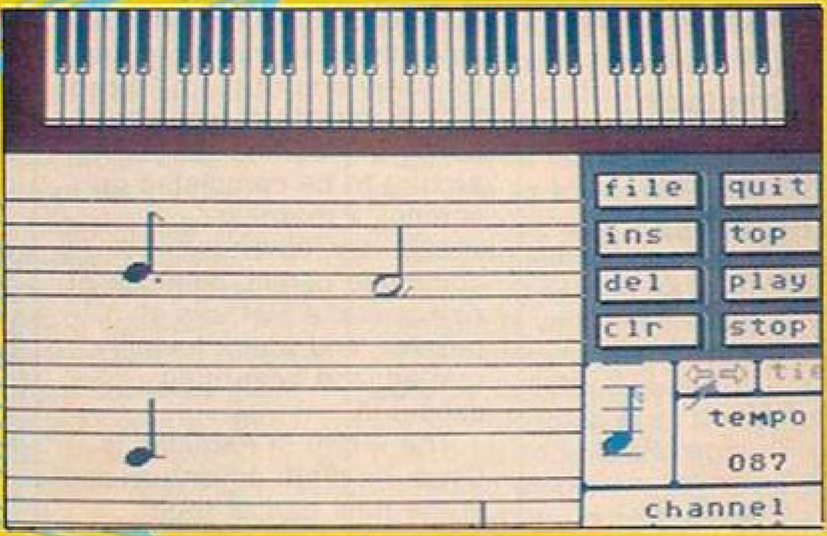
The long-awaited release of Fractalus and Ballblazer, both Lucasfilm games, will be followed up by more — the Eidolon and Koronis Rift (reviewed in this month's Software Shortlist) are the latest.

Apart from Ballblazer, all the games use fractals — a special branch of mathematics. David Fox, a three-year member of the team set up by the film company that brought you Star Wars and Raiders of the Lost Ark defines fractals thus: "It's the smallest portion you can break something up into — where all the component parts look alike." Huh? "Well, it's like when you look at the night sky. You magnify portions of it until you have small bunches of stars that look alike. Then you could use them to build different patterns. Fractals aren't significant, really. They're just a random breaking of the lines in the graphics, instead of straight lines which would be sterile."

Rescue on Fractalus and Ballblazer were developed originally as a kind of jam session for the new team, to get the feel of how they could approach game design and work together as a team. "Then we realised the games were good enough for release. Lucasfilm had a deal with Atari at that time, but when Jack Tramiel took over Atari, everything got delayed. Eventually the games were picked up for distribution by Epyx in the States and Activision in the UK". And US Gold are still smarting.

Left to right: John Davy, Martyn Bysh and product co-ordinator Andrew Wright spearhead Activision's play-testing.





As above so below: Activision's new Gamemaker utility enables you to create background sound and background trees.



Lucasfilm saw the computer games division as a way into interactive entertainment. Several different areas are under exploration — laser discs, mass-storage CD Roms, and broad-based game situations with many players playing at the same time. "At some point, as the technology becomes more advanced, it will become more and more interactive with the film industry." And Lucasfilm are preparing for the millenium.

Activision's strength up to now has been their world-wide presence, even selling MSX material into Japan, as well as the Netherlands and the rest of Europe. Their weakness in Europe has been reliance on US disc-related product. The reluctance of the average British punter to go out and spend money on fast-access storage means tiresome conversion of disc games for cassette which can drastically change the character of a program. Now with the new input from Electric Dreams, it looks like Activision finally mean to take the stage in Europe.



QUEST CORNER

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

THE WORM IN PARADISE

▶ *Various • £9.95 • Level 9*

This latest text and graphics masterpiece has all the splendid qualities we've come to expect of Level 9 — masses of locations with a colourful fast-drawn picture for every one of them (except BBC B versions), type-ahead ability (no waiting for text or picture to be completed on screen), a massive vocabulary, advanced command parser, lashings of rich prose, a plethora of puzzles, and a plot lovingly crafted, and beautifully executed.

The Worm in Paradise is Level 9's ninth adventure and is the final part of their Silicon Dream trilogy (the other two parts are Snowball and Return to Eden but you don't have to have played them to enjoy this one). You play a citizen of Enoch megapolis on the planet Eden, a century on from the time of Snowball and Return to Eden. When the game starts, that's all you can remember. The quest? Reach the Seat of Power.

"Wot, no delectable Kim Kimberley?" the afficionados cry. "Oh yes there is," comes the retort — seek and ye may find. To further whet your appetite, this engrossing and challenging adventure features such diversities and diversions as a Jobcentre Droid, a Socialist (Enoch is very right-wing usually), Wiggly Roots, a non-fattening pizza, the Fabulous Riverboat, a flying saucer, the Dream Palace (a high-tech amusement arcade based on dreaming), and the Worm (you'll possibly never eat another apple again!).

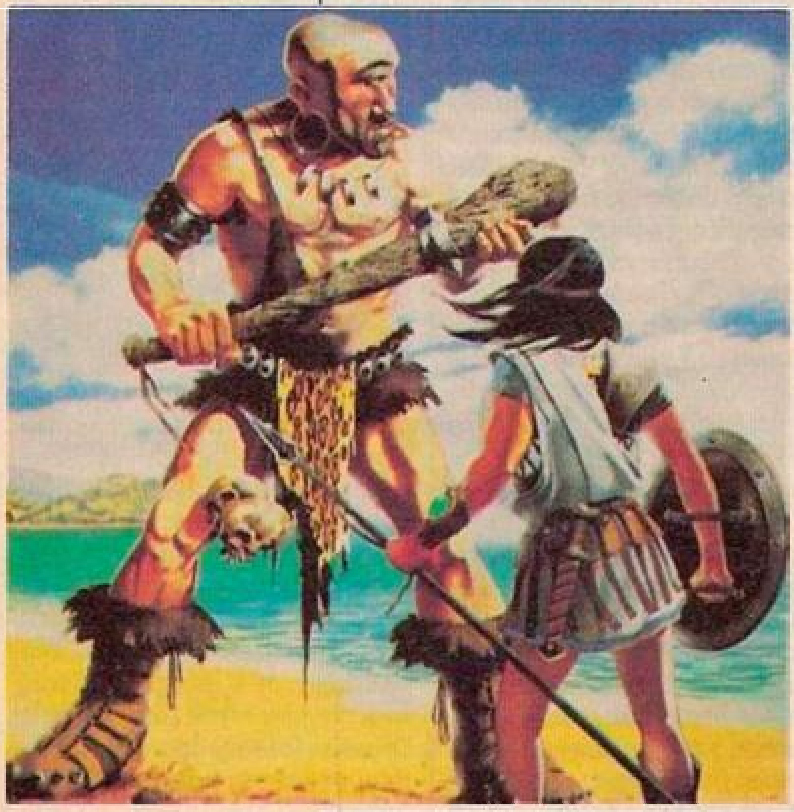


THE ODYSSEY

▶ *Commodore 64 • £9.95 • Duckworth*

The Gerrard brothers, Peter and Mike, co-authors of this new text adventure, come with worthy credentials. As well as having played and reviewed many adventures for a variety of home computer magazines, they have also published books on writing and playing adventures.

Homer's epic, The Odyssey, a blend of fable and history, is one of the earliest adventures ever written. Now a mere 3,000 years later, the Gerrards have taken the story of Odysseus's trials and tribulations for us to relive in this 80K, two-part adventure.



Odysseus is about to return to Ithaca, the 10-year siege of Troy having just ended. As Odysseus, you must gather a crew and supplies and take the danger-fraught trip back to your kingdom across the waters.

Among the many mythological malefactors you'll have to face are giants, Sirens, Cyclops, Lotus eaters, Scylla (and her sextet of heads) and Charybdis (a rather nasty whirlpool). If that's not enough to be getting on with, why not take the scenic route across the River Styx to the underworld, thence through the City of Perpetual Mists for a jolly tête á tête with the lost souls of the dead.

Commands are given by the accepted verb/noun input and the location descriptions are well detailed. Presentation is a shade on the dull side, being standard Commodore upper and lower case lettereing (with an asterisk as a prompt) against a changing coloured background. Should you get killed off, there's some reloading of data necessary before you can start again — fortunately, this doesn't take long.

The adventure is divided into two parts over two cassettes and uses a fast loading system. This is a big, interesting and well-planned adventure which should ensure you get your money's worth.

A HELPING HAND

Terrormolinos, although fairly easy, is causing some head scratching:

Keep getting heatstroke and sunstroke?
SKNU RTDN ANOI TOLN ATNU SYKN AHRA EWDN AYKN AHTO NK

Problem in the bull ring?
POHS ANIHC OT LLUB DAEL NEHT YKNAH DETTONKNU EVAW

Quite a few adventurers are still struggling with Gremlins.

Being followed everywhere:
RABM ORFA REMA CNOH SALF ESU

Run over by snowplough?
a) RETI NGID NAEL TTOB HCRO TTEG
b) HGUO LPWO NSDL EWNE HTHC ROTE TING IEVL AVNE PO

DATACHAT 1223

▶ *GEC Comms • Modem • £89.95 and £99.95 with BBC software*

The modem which reduces your 'phone bill hasn't been invented yet. But at least GEC's Datachat can help with electricity costs. It's powered solely by the telephone line and has no mains connection at all.

It offers just one signalling standard, V.23 1200/75, but it can act as either Prestel terminal or viewdata host.

Overall, the modem is rather smaller than it looks from photographs, and seems very solidly made — the box is metal, not plastic. And it carries the green BABT approval sticker.

Controls are very basic — just an on-line/off-line button and another for transmit/receive (puzzlingly, the markings are topsy-turvy compared to other modems: when you originate a call, you must switch to receive). On the back there's an extension telephone socket and a five-pin DIN data connection.

The data interface is RS232C-compatible, so you could use the Datachat with almost any computer with a serial port and with all sorts of communications software.

But for the BBC Micro, GEC have developed a package of their own. Available on disc or in eprom, it's suitable for both Prestel and Telecom Gold (the screen can be switched to 40 or 80 columns). In addition, it provides a special 1200bit/s user-to-user mode which makes use of the modem's ability to turn the line round under software control.

With this software running, the modem is controlled by the computer's function-keys and the many facilities make for a crowded key-strip. But on the disc there's an extensive help-file to shepherd the new user through the uncertainties of logging-on for the first time.

The package includes some clever tricks, though the best ones work only when there's a Datachat set-up at the other end too. For example, the distant operator can enter the name of a file on your disc and make your computer send it automatically, without your touching the keyboard. And to ensure perfect transmission, he can invoke a special error-correcting protocol.

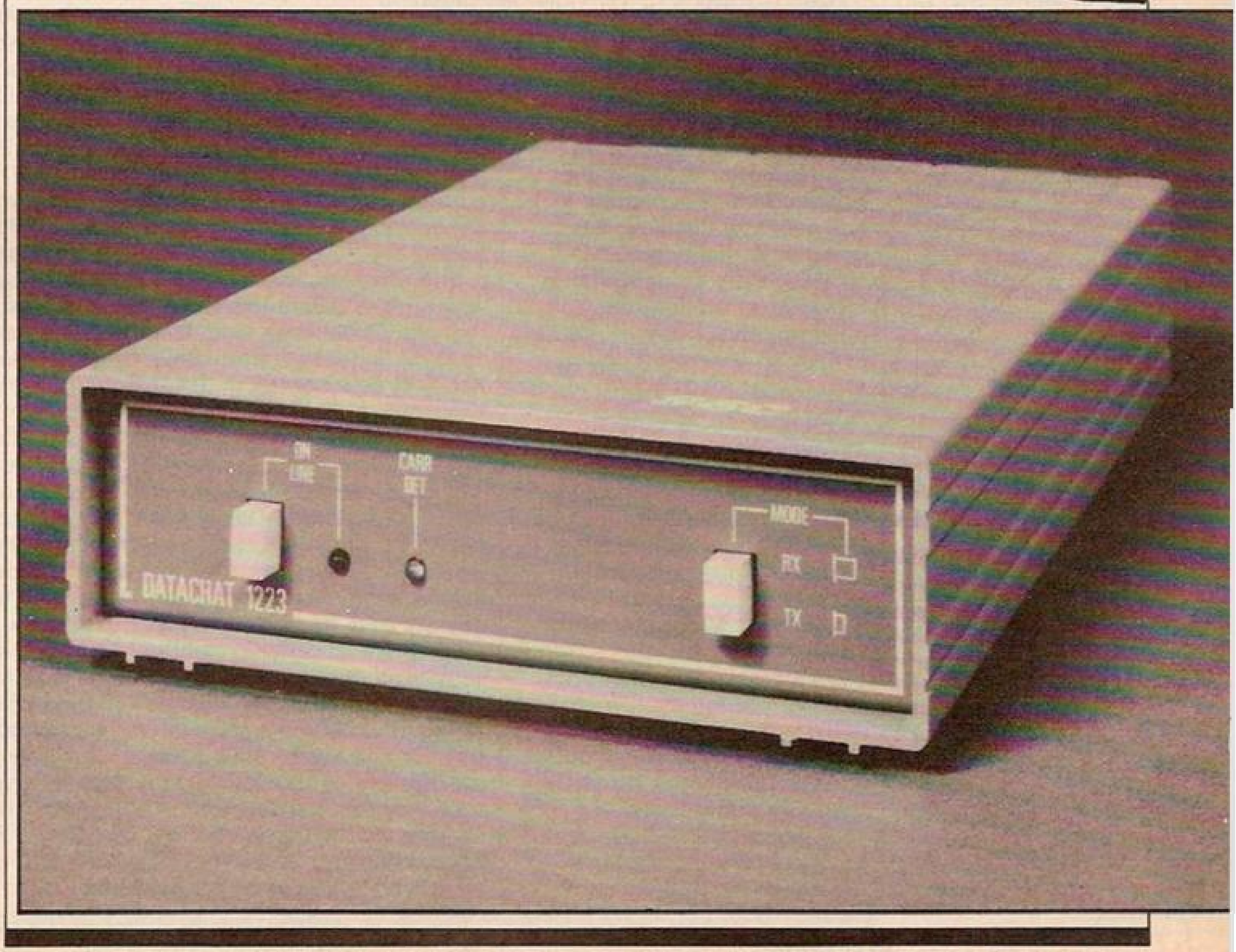
Exchanging files by this method turned out to be quick and easy. But if something happened to go wrong anywhere (through a disc error at the remote end, for instance) the system could end up waiting helplessly for a block that would never arrive, giving no guidance as to what the user ought to do next.

Unfortunately, the protocol does not appear to be compatible with the Xmodem (or CP/M) arrangement widely used by bulletin boards, so any downloading from these has to be done in the non-corrected mode.

This brings us to the one glaring omission in the viewdata department: there's no downloading capacity for Prestel telesoftware. GEC tells us they are thinking of putting this right; and indeed they should lose no time in doing so, since it's the prospect of free software that tempts many Micronet users to sign up in the first place.

However, there are also one or two lesser problems with the Datachat software. It isn't

(continued on next page)



• GEC's Datachat — powered solely by the telephone line.

DATACHAT 1223

(continued from previous page)

possible to send operating system 'star' commands from the main menu: you have to wait until you're on-line and receiving a carrier from the other end before you can do that. So if you want to catalogue your files or switch drives, or whatever, you must either do so in public or else exit from Datachat and begin again.

Furthermore, the first issue of the disc version was so well protected against copying that it appeared to run only on the standard model B with Acorn DFS. If you have anything else or are planning to upgrade, make sure you get a later issue.

The Datachat modem on its own is very recommendable. But with the price-gap steadily closing between V.23-only modems like this one and the multi-standard variety such as the Pace Nightingale or Miracle WS2000, you would be wise to consider whether it is worth paying the little extra to have a 300bit/s mode plus the possibility for expansion options such as an autodialler or auto-answer board. After all, you might want to run your own bulletin board some day.

But the software, though cheap, is not up to scratch. And you would be unable to make the most of it unless your friends were using it too. So for the moment, Beeb users are better off with the likes of Commstar and Databeeb.

MAGIC MODEM

▶ Datastar • £79.99 • Commpanion software for Amstrad or BBC Micro • £20

Does the ghost of the late Demon (or Unicom) modem still stalk the computing world? It's hard to avoid comparing the new Magic Modem with the Demon, since they have a common ancestry. At any rate, the distributors have the same address.

And besides, there is the same combination of feature-packed specification and alluringly low price. Both are direct-connect modems for various permutations of the V.21 and V.23 standards. Yet the Magic Modem seems to succeed where the earlier design created difficulties.

For example, instead of attempting to tackle all the rather complex switching in software, the designer has given us a traditional-style six-way rotary mode-switch (it includes an off-line test position) plus a row of status lamps. So there's no doubt about what mode you're in, or whether you're on-line.

However, it's the software which can make or break a communications package, and in this case the Commpanion Rom certainly makes it.

The Demon CommZromm did everything by star-commands, which meant you could incorporate communications features in your own programs. So you could write your own bulletin-board software in a few lines of Basic. Commpanion takes the more conventional approach of control by function-keys; rather more restricting, you might think, but much easier to use.

However, when it comes to features, comprehensive is hardly the word. The viewdata section includes an effortless telesoftware downloader, extensive page-tagging facilities and — unusually for an eprom package — an off-line mailbox editor which allows the use of colour and graphics.

Sending mailbox messages is one of the hardest Prestel skills for the newcomer to master, so an editor and uploader as good as this one deserve a welcome.

In viewdata mode, the Magic Modem can be operated with the data rates reversed; so with the optional auto-answer board you could choose to run it as a viewdata host.

The other department, which gives a scrolling text terminal (300bit/s as well as 1200/75), is just as interesting. Xon/Xoff flow control and Xemodem (CP/M) protocols for file transfer are both provided, and incoming text can be spooled to disc or sent to the printer. Those functions which involve files worked faultlessly even with my highly non-Acorn double-density DFS, so compatibility problems with other systems should be most unlikely.

Decorative features such as foreground and background colours and screen mode are all alterable by the user. So are many internal settings such as text window size, parity checking, data block size, echo action and timing. Sensible defaults are provided, but the configuration commands are arbitrary and difficult to remember, so the reference list in the manyal is essential when anything unexpected crops up.

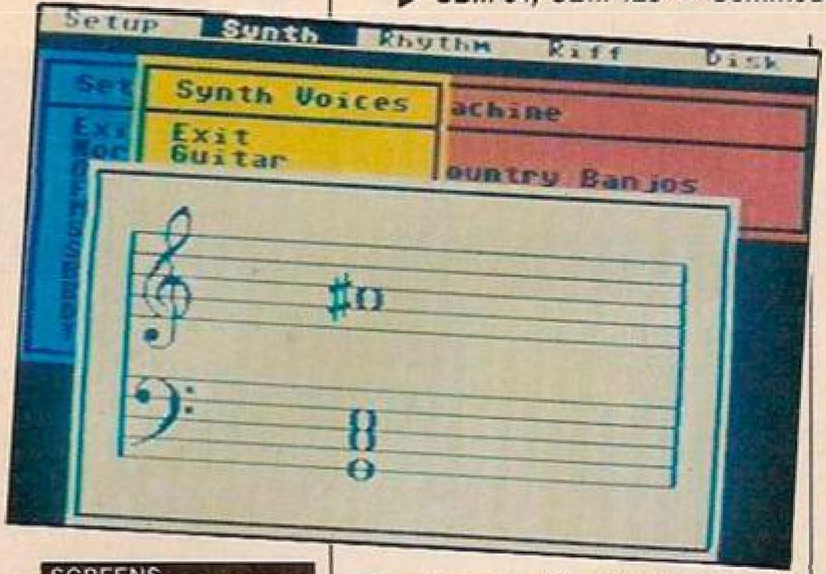
Fortunately, the manual is very detailed and it includes a useful problem-solving section at the end of each part. But the text itself, from a non-NLQ dot-matrix printer in condensed mode, is hard to find your way around in an emergency. However, you can call up an on-screen help list for a quick reminder of which key does what, and it doesn't destroy the data behind it.

Apart from intermittent minor problems with the autodialler and in getting the software set up for 1200bit/s user-to-user working, the combination performed exactly as billed and was very enjoyable to use.

But one niggle is that, like the Demon, the Magic Modem has no telephone socket on the back. It's highly desirable to have a means of eavesdropping on your line, especially if the modem has an autodialler. How else can you tell why a call has failed? And how can you stage-manage a file-swapping session without switching to voice now and then? A certain amount of discussion is surely unavoidable! Of course, you can always go out and spend another fiver on a two-way telephone adapter, but why should you have to?

SOUND EXPANDER

▶ *CBM-64, CBM-128 ● Commodore/Music Sales ● Music Synthesiser add-on ● £99.99 ● Tony Sacks*



SCREENS

● The FM sounds are great, but the Sound Expander's Cosmic Wow soon wears thin.

The precise, life-like tones of FM — frequency modulation — sound synthesis dominate the professional music synthesiser field and punctuate almost every hit record. Now for under £100 you can add eight channels of FM sound to a CBM-64 or 128 using Commodore's Sound Expander.

It snuggles into the computer's cartridge port and can be played using either a £69.99 full-size, four-octave keyboard or the Music Maker QWERTY keyboard overlay.

Sound output is through a television or hi-fi speaker.

A trapdoor in the top of the expander will take a MIDI interface which Commodore plans to market soon at the commendably low price of £24.99. This will allow you to link your expander to electronic instruments such as synthesisers and drum machines.

On start-up of the disc version you are presented with a musical stave display and a choice of five drop-down menus: Set-up, Synth, Rhythm, Riff and Disk.

Set-up allows you to choose between playing with eight notes of one sound across the whole keyboard or "splitting" the keyboard so that there are different sounds above and below the split point. In the split mode you can play full chords by pressing just one bottom-half note — or a key on the lower two rows of the QWERTY keyboard.

If you are using an external keyboard, another function allows you to play a chord which will be memorised and can then be played as a single-note elsewhere on the keyboard.

Synth lets you choose the sounds for the whole keyboard or for each half when in the split mode. A dozen pre-programmed voices are available on start-up with an alternative 12 on the disc-based version of the expander. The sounds have the sparkling clarity typical of FM sounds. There are some powerful synthesiser-type voices and a delightful percussive glockenspiel. On the debit side, the piano sounds are unconvincing, and you tire quickly of gimmicks such as "cosmic wow" and "alien".

The only control that you have over a sound is to make it brighter or more mellow. You cannot change its fundamental character. More adventurous tampering with the potential of FM will have to wait until Commodore releases a sound editor program later this year.

In the meantime you can thicken up the sounds by turning on an "ensemble" function which doubles up the voices, giving added depth and vibrancy to some sounds, but halves the number of notes you can play simultaneously.

Rhythm provides a choice of 12 rhythmic accompaniments in an assortment of styles including rock 'n' roll, bossanova and two variants of disco. You can have just a percussion section or by pressing the single finger chord buttons/keys you can add a pre-programmed musical accompaniment, supposedly in the style of the selected rhythm.

Riff and Disk are used together. With the Disk option you can load further voices for the synthesiser or demonstration tunes and "riffs". The riffs are snatches of backing pattern, a few bars long, in styles such as "big band" and "country banjos". For each style there are 12 different riffs which can be chained together in any order to form a "song".

The riffs and demonstration tunes are handy for impressing your friends but seem to have little lasting value.

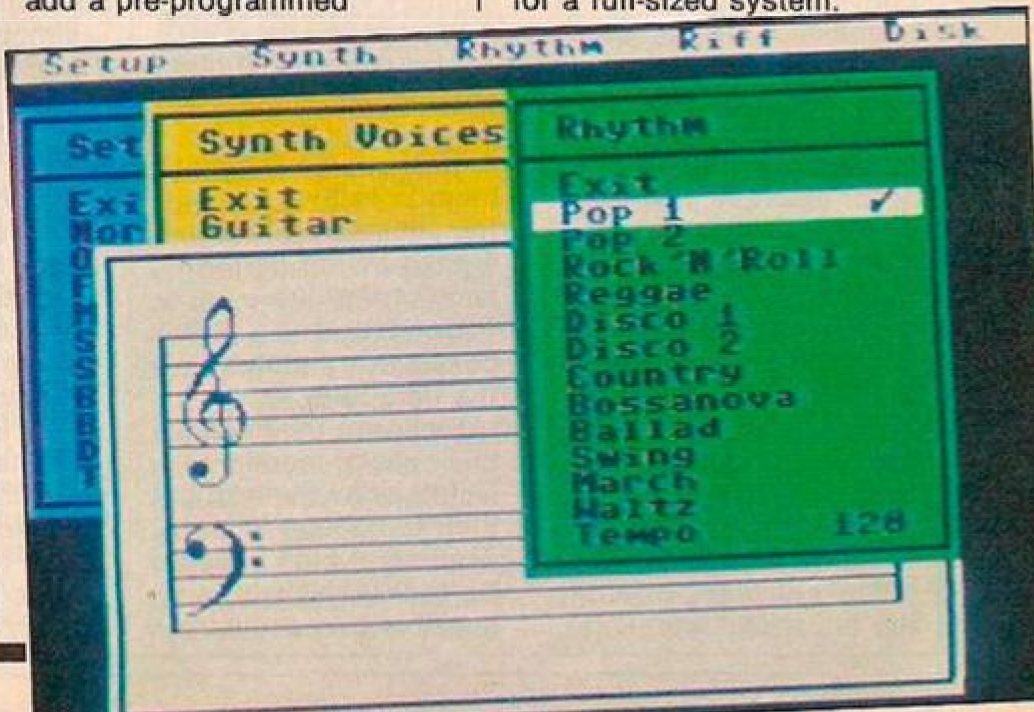
The basic Sound Expander package turns your computer into something like a home organ with high-quality preset sounds. It does not allow you to program new voices or record what you are playing, but the next expander software package, due soon, will provide the system with a real-time and step-time recorder.

The only direct competitor for the expander is Siel's Sound Buggy, also for the 64/128. The two products are similarly priced and perform similar functions, but Commodore's expander wins through on the quality of its FM sounds.

If you don't own a Commodore computer then the competition offered by Yamaha's CX-5M computer-synthesiser is tougher. It has recently come down in price to under £300 for a mini-keyboard system and £350 for a full-sized system.

SCREENS

● Thumbs up for the drop-down menus, and a raspberry for the "reggae" rhythms which would cause a few sniggers in Jamaica.



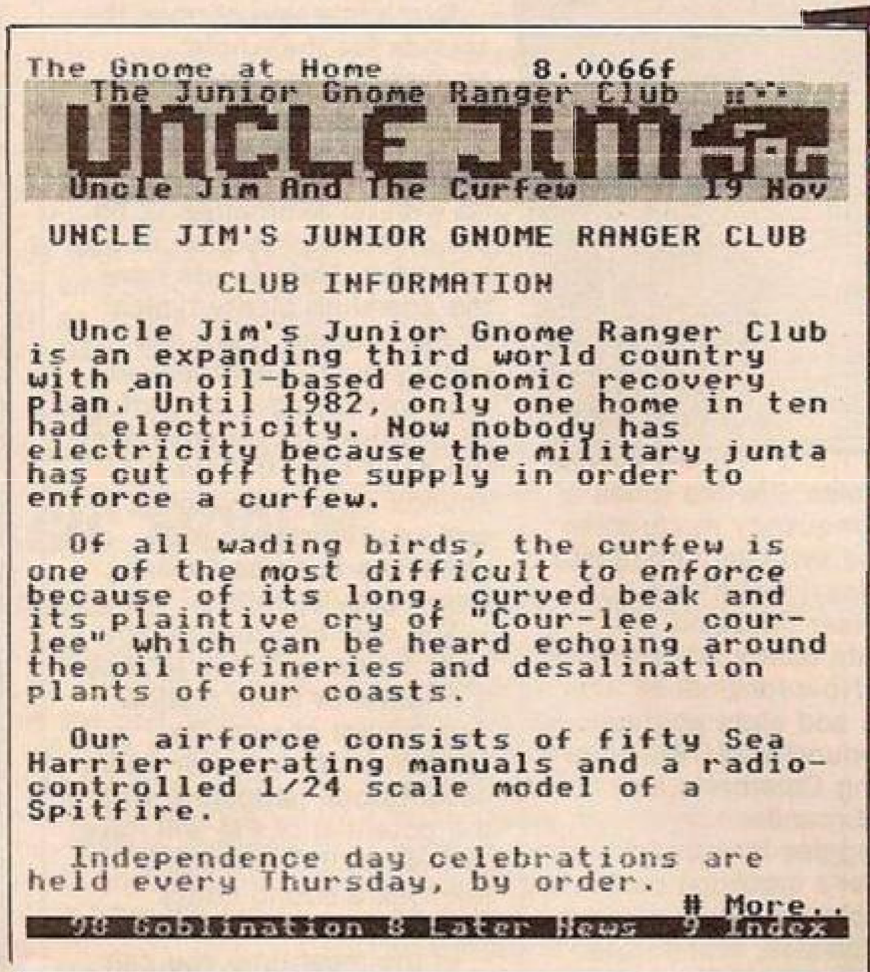
Modem World

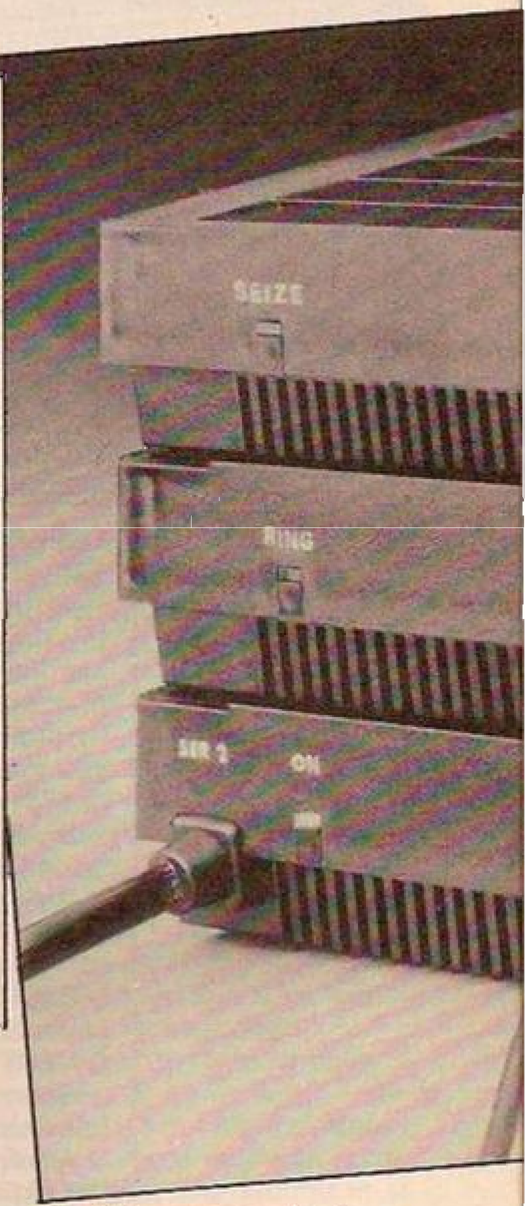
Richard Lambley on how to get in touch.

Jargon: there's probably more of it surrounding communications than any other aspect of computing. But don't let it unnerve you — you'll easily get the hang of it. Modems can give you a great deal of innocent entertainment and they're cheaper than almost any peripheral except joysticks. If your interest in computing extends anywhere beyond arcade games, you'll find the whole business irresistible.

With a modem, you can — in theory — connect your computer to any other computer on earth. You can send and receive electronic mail through message-forwarding systems such as Telecom Gold, Comet, One-to-One or Easylink. You can swap messages and gossip through a worldwide network of computer bulletin boards run by fellow enthusiasts. You can search multi-megabyte databases such as Knowledge Index or play multi-user adventure games against unseen rivals. You can attend to your financial affairs with telebanking on Prestel, send a Telex, treat yourself to a bit of teleshopping and finish up by downloading some software. You can fire off a letter to *Your Computer*. And you can swap files with your friends by dialling them direct.

Sounds expensive? Well, some commercial electronic mail and information retrieval systems undoubtedly are. They're intended mainly for businesses which can afford them; although lately, Telecom Gold has become available to the small user in digestible form as Microlink. But bulletin-boards cost nothing at all beyond the price of the 'phone call. And with a suitable set-up, you can even run your own and watch other people pay!





There's far more to Prestel than Micronet 800: one of the most active sections is Timefame 818, above, with something to interest almost everyone. Right, the Tandata package for the QL and, far right, Educational stuff for the little ones from the Gnome and his cronies.

But of the commercial databases, two especially are popular with the home user. One is Compunet, which is exclusively for Commodore owners.

It costs £79, but when you buy Commodore's own modem pack, you get your first quarter's membership thrown in for nothing.

Bigger and better-known is British Telecom's Prestel, which can be accessed from practically any home micro. Prestel is very reasonably priced for the private user. The basic charge is £6.50 for three months, which gives you access to the majority of information-providers listed in Prestel's 90-page directory-cum-magazine, plus the use of the Mailbox messaging service.

On top of this you can pay £10 for admission to Micronet 800 and its rival Viewfax 258. These are special areas of Prestel dedicated to the home computer user, with up-to-the-minute news, interactive games, technical information and much more. Provided you avoid calling Prestel during business

Bits and bauds

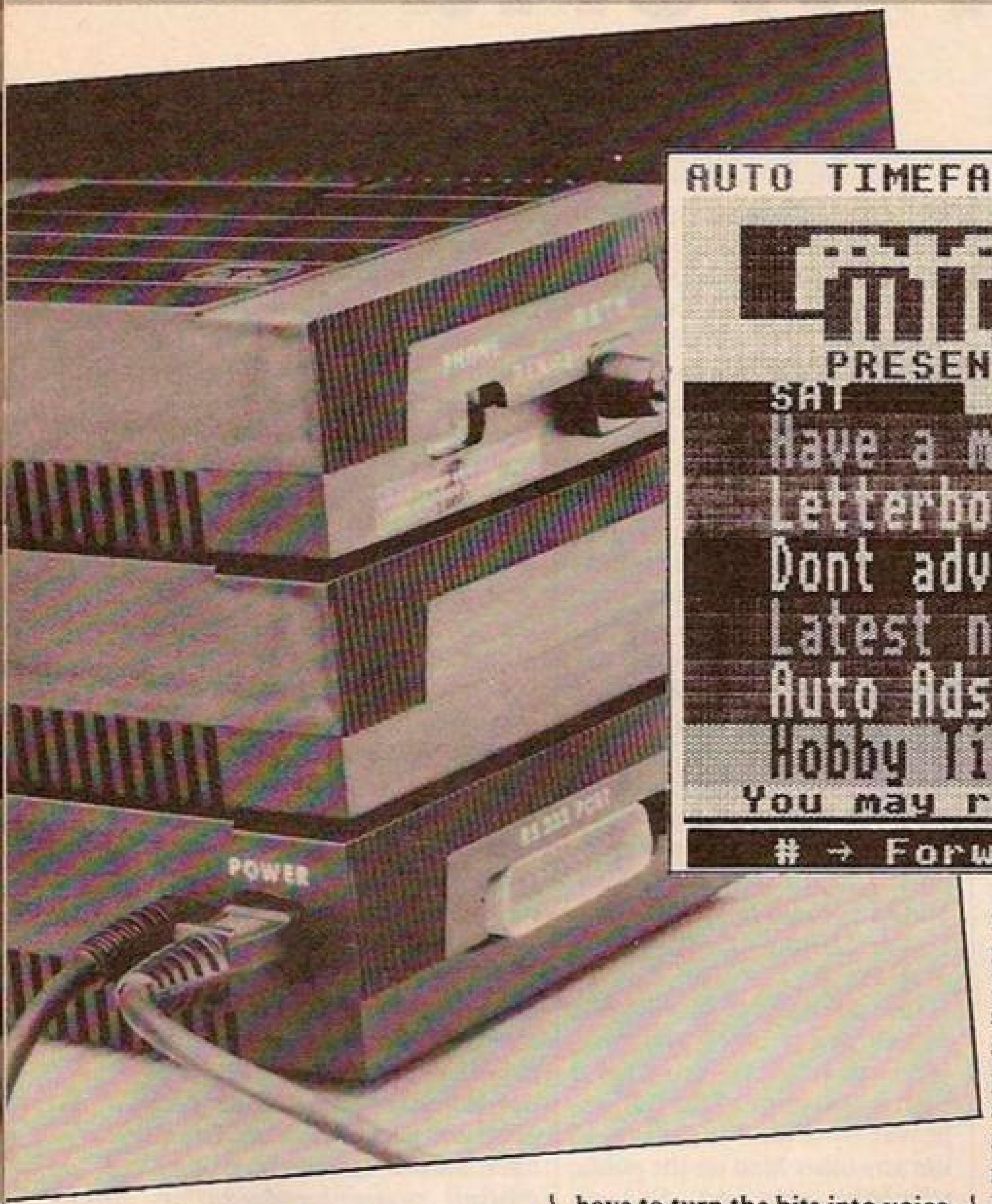
Each byte to be conveyed on a telephone line has to be converted into a succession of bits, so that the modem can turn them one at a time into the appropriate audible tone; high for a 1, for example, low for a 0. With suitable 'packaging' bits to mark the start and finish of each byte (and maybe a parity bit as a check that it gets received correctly), you end up with ten or eleven beeps per byte.

The rate of warble — which is to say, the actual signalling rate on the telephone line — is expressed in baud, in honour of the French telegraphy pioneer Baudot. So with an ordinary viewdata modem, 1200 baud is equivalent to 1200 bits per second: one bit of data per burst of tone. And of course the maximum possible transmission rate is limited by the performance of the line.

However it *is* possible to bump up the data rate.

Business users can buy special modems which allow them to cut their telephone bills by sending at high speeds. Up to 9600 bit/s is possible over ordinary 'phone lines, still more on private wires, though the modems come expensive. The data rate (in bit/s) is normally a simple multiple of the signalling rate (in baud).

To achieve such speeds, the modems at each end transmit *synchronously*: that is, they are locked together by a clock signal. When there is no data to send, the line must be padded out with null characters. This is in contrast with ordinary low-speed, *synchronous* modems, where each end can wait for the next byte more or less indefinitely.





hours and you keep off pages for which there is a charge, you need pay nothing further. Usually, your 'phone call will be at the local off-peak rate, so it can work out quite a bit cheaper than going to the pictures.

To get at these services, you need a modem, software to make your computer drive it, and a telephone socket (if you haven't got one, contact your local telephone area office).

I've assumed here that you want a direct-connect, plug-in modem: you can buy acoustically-coupled modems, which have rubber cups to push the telephone handset into, but they're more temperamental to use. However, if you expect to do a lot of modeming from telephone kiosks they may suit you perfectly.

The word modem is short for "modulator-demodulator". It simply means a box which translates the digital ones and zeros of your computer into audible tones which can be sent down a 'phone line — and vice versa. Conversion is necessary because ordinary telephone lines can't handle bits directly: you have to turn the bits into voice-frequency sounds. So if you eavesdrop on the line, what you'll hear is rather like the twitter of a games cassette.

Each byte must be unpacked into a series of eight bits before transmission, then reassembled at the other end. If your computer has a serial port it can already do this trick, and you can pick and choose from the multitude of general-purpose modems now on the market. If you haven't a serial port and can't get one as an add-on, you'll have to resort to a plug-in modem pack designed especially for your computer — which could be a little more expensive.

The commonest serial interface standard for modems is RS232. This calls for a rather expensive 25-pin connector, of which only four or five pins are generally needed. Most home modems therefore have a cut-down version — a bit like the RS423 port on the BBC Micro. So make sure the modem you buy comes with the right connecting lead for your computer.

Audio connectors are normally what you'll find; and a new arrangement to look out for is the S5/8 interface, which is based on a cheap eight-pin DIN connector and is expected soon to receive official blessing as a British Standard. For most purposes, S5/8 users can get away with ordinary five-pin audio plugs. One of the first modems to adopt S5/8 is the M1 cellular radio modem from Transam, for communicators on the move.

Perhaps the biggest decision you need to make in choosing a modem is which signalling standards you want. And that depends on what you want them for.

The earliest dial-up modems sent data at a rate of 300 bits per second, which corresponds to a maximum of 30 characters per second. Most bulletin-boards and dial-up information services still use this system. But recently the faster viewdata standard of Prestel has gained popularity: using a different combination of tones, it sends 1200 bit/s to the subscriber and accepts 75 bit/s back (which is still a good deal faster than most of us can type). With the advent of software such as the Communitel viewdata package and Pace's low-cost colour-capable OBBS for the BBC Micro, more and more business and private systems are adopting 1200/75.

These modes are called full-duplex, which means you can send in both directions at once. Certain other modes, called half-duplex, allow only one end

(continued on next page)

Modem standards: the V series

The technical details of modem signalling are defined by the CCITT, a committee of the United Nations.

The CCITT's V series of recommendations covers every aspect of sending data by telephone. As far as modems are concerned, among them are V.21 (the 300 bit/s system) and V.23 (which includes viewdata and other 600 or 1200 bit/s modes): you'll see these terms used on manufacturers' handouts. Some V recommendations relate to high-speed modem standards (such as V.22, which provides simultaneous two-way working at 1200 bit/s). But there's also V.25, which defines a protocol for intelligent modems — ones which can auto-dial, auto-answer and so on under software control. And there's V.24, which is the same as the RS232 serial interface.

Modem World

(continued from previous page)

to send at a time.

But a modem designed for just one set of tones won't recognise any other kind. So unless you're certain that you don't want Prestel, or don't want 300 bit/s systems, it makes sense to buy a multi-standard modem which can handle both. Some dual standard modems now cost less than £100, so the relatively small extra cost should be well worth while.

It is possible to buy modems giving still faster speeds, but at present there is little opportunity for amateurs to use them, other than on the commercial electronic mail systems.

To use a modem, you need software of some sort. Characters coming in from the 'phone line must be routed to your screen, while those you type at the key board must be sent out to the line.

The more sophisticated packages have lots of extra features: examples are storage of incoming data in a memory buffer and on disc or tape; off-line editing for electronic mail; an echo facility (so that you can see what you're typing, even when the other and doesn't return your input); software flow-control (which means that the computer at one end can make the other one wait if it gets too busy); error-free file transfer for swapping software; auto-dialling and auto-answering (for use with modems which have suitable hardware features); an on-screen clock, for keeping track of your telephone bill; and options to change the make-up of the data word, for dealing with unusual systems.

For viewdata, your communications program may have to work even harder. When you press Return or Enter, the character that should be sent is not a carriage-return but the Ascii underline character; and to confuse you further, Prestel represents it on the screen as £.

Besides coping with such bizarre contortions, the program may also need to re-jig your screen. With the BBC Micro, things are very straightforward, because the teletext mode (mode 7) is already just what's wanted for viewdata. But with many other micros, the 40 by 23 display format, the colour and control characters all have to be cooked up in software.

There are packages also which allow you to run your computer in reverse, as a "host" system. With these you can operate your own bulletin board or mini-Prestel service, with news pages, special interest areas, messages and software to download. To do so, you'll need a suitable auto-answering modem plus the willingness to allow total strangers to hog your telephone line at all hours.

Incidentally, it's worth observing that data communication doesn't necessarily mean using the 'phone. A novel software package for BBC-owning amateur radio buffs gives extensive radio-modem facilities, yet calls for no modem hardware at all. Amprom, from CTP software (£18 in Eprom, £9 for the sideways Ram version), does it by reprogramming the cassette port; and it offers such possibilities as radio-teleprinter chit-chat and automatic file transfer over the air.

One modem should work just as well as any other which has the same facilities, provided it carries the green BABT approval label (and it's illegal to use any other kind on the public telephone network). So you may as well choose largely on price.

But what do you get by buying an *expensive* modem? Well, some of the more exotic business modems operate at higher speeds, have built-in diagnostic features, may include error-correction or data scramblers and can often do tricks like dialling up a stand-by line when the regular one goes wrong. They have have built-in data buffering to cope with problems such as getting into Prestel with a computer which can't send and receive at different rates. And they may be able to select the correct control settings automatically.

But even on the low-cost, low-speed modems we're mainly interested in, we're starting to see features such as software control. For the manufacturer, the switches on the front panel may be among the most expensive components in his design, and it can often be cheaper to junk them in favour of a little more complexity in the electronics: a dedicated micro-processor, perhaps. Having decided on this, the designer can often add tricks which until now have only been seen on units costing many hundreds of pounds.

Modems with tricks are known as intelligent (or, in

General purpose

DaCom DSLV21 Buzzbox: V.21, battery or mains-powered, very small, £80. Auto-answer option. Range includes V.21/V23 professional models.
Digisolve ChipChat, V.21/V.23, auto-answer, £219. Bell mode and autodial options.
DCE-Interlekt Prospect, V.21/V.23, £144; Portman (auto-answer), £199.
GEC Datachat 1223: viewdata terminal/host, £90. With software for BBC (including user-to-user features), £100. No mains unit: power provided by the telephone line.
Miracle Technology: WS2000 V21/23, £155 with introductory subscription to Micronet 800 and Microlink. Dial, answer and software control cards available. Databeeb software for BBC, £30. WS3000 series with professional features, from £340.
Micro Technology: Inter-Mover range, V.21/V.22/V.23, from £113; M4000 microprocessor driven V.21/V.23, from £215; acoustic couplers for V.21 and viewdata, from £98. Also Minimodem range of acoustic couplers, from £98.
Prism Modem 1000: receive-only viewdata plus 1200 bit/s user-to-user. Available with software and leads for a variety of micros; from Modem House, £80 upwards.
Pace Nightingale, V.21/V.23, £136, including vouchers for Micronet 800 and Microlink. With serial interface and eprom software for Amstrad 464, 664 and 6128, £150. With Commstar eprom for BBC, £165; auto-dial/answer options, £68; OBBS colour bulletin board software for BBC, £24.
Miracle Technology: WS2000 V21/23, £155 with introductory subscription to Micronet 800 and Microlink. Dial, answer and software control cards available. Databeeb software for BBC, £30. WS3000 series with professional features, from £340.
Modular Technology: Inter-Mover range, V.21/V.22/V.23, from £113; M4000 micro-processor driven V.21/V.23, from £215; acoustic couplers for V.21 and viewdata, from £98. Also Minimodem range of acoustic couplers, from £98.
Prism Modem 1000: receive-only viewdata plus 1200 bit/s user-to-user. Available with software and leads for a variety of micros; from Modem House, £90 upwards.
Pace Nightingale, V.21/V.23, £136, including vouchers for Micronet 800 and Microlink. With serial interface and eprom software for Amstrad 464,664 and 6128, £150. With Commstar eprom for BBC, £165; auto-dial/answer options, £68; OBBS colour bulletin board software for BBC, £24.
Tandata Tm110, intelligent viewdata modem with auto-dial and storage for eight numbers and passwords, £114. Tm220 has V.21, viewdata host mode and 1200bit/s user-to-user modes also, £199. Two further models with professional features, from £339.
Viccom, V.21/V.23/Bell, £110. Software for BBC, £39; Poseidon viewdata host software for BBC, £170.
Some bargain-price ex-BT modems are available from Display Electronics: prices begin at £35.

Addresses
Amstrad, P.O. Box 462, Brentwood, Essex CM12 4EF.
Computer Source, Brahmslaan 129, 2625 BV Delft, The Netherlands.
CTP Software, 107A Shacklewell Lane, London E8 2EB.
DaCom Systems Ltd, Sunrise Parkway, Linford Wood, Milton Keynes MK14 6LU.
Datastar Systems, Unicom House, 182 Royal College Street, London NW1 9NN.
DCE-Interlekt Ltd, 24 Portman Road, Reading RG3 1LU.
Display Electronics, 32 Biggin Way, London SE19 3XF.
Digisolve, Aire and Calder Works, Cinder Lane, Castleford, West Yorkshire WF10 1LU.
GEC Telecommunications Ltd, P.O. Box 53, Coventry CV3 1HJ.
Microlink: Database Publications, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.
Micronet 800: 8 Herbal Hill, London EC1R 5EJ.
Miracle Technology (UK) Ltd, St Peter's Street, Ipswich IX1 1XB.
Modem House (D.T.M.C. Ltd), 70 Longbrook Street, Exeter EX4 6AP.
Modular Technology Ltd, Zygal House, Telford Road, Bicester, Oxfordshire OX6 0XB.
One-to-One, Scorpio House, 102 Sydney Street, London SW3 6NL.
Pace Micro Technology Ltd, Juniper View, Allerton Road, Bradford BD15 7AG.
Skywave Software, 73 Curzon Road, Bournemouth BH1 4PW.
Tandata Marketing Ltd, Albert Road North, Malvern, Worcestershire WR14 2TL.

America, "smart") modems. The kind of things you can expect are auto-selection of the right data rate and the ability to log-on automatically simply by sending the telephone number and passwords to the modem as a character string.

A few designs, such as the Datastar Magic Modem (£99.95) and the earlier Demon (formerly Unicom) modem for the BBC Micro, simulate intelligent control at low cost by borrowing the power of the attached computer.

For a full description of the Magic Modem see the review in this month's Hitlist. When it's beefed up by the Commpanion software, in eprom for the BBC and Amstrad, it is a highly attractive package, which scores by being exceptionally comprehensive.

Communications modules and software

Amstrad
Amstrad RS232 interface, £50. Modem House micropack, including modem, Skycom rom software and leads, £180; choice of other modems at prices from £130 inclusive. Also Skywave bulletin board software, £50. Pace communications package with Nightingale modem and software, £150.

Atari
Miracle Technology Datari serial interface and communications software, V.21, V.23, £60. Modem House serial interface for 600XL, 800XL and 130XE, £50; allows use of general-purpose modem.

BBC
Datastar Magic Modem with Commpanion software V.21, V.23, £100.
Acorn Prestel Adapter, built-in autodialler, with software £139.

Demon Modem: V.21/V.23 with many automatic features, from Walkbury Consultants at £96.39 including software.
Le Modem, V.21/V.23/Bell modes, many features, £102 including software and cables from Watford Electronics.

Commodore
Miracle Technology 64 Multimodem module, V.21, V.23, Bell 103, built-in software, £116.75.
Viccom modem, V.21, V.23, Bell modes, £79; CBM64 cable, £8; dial/answer card, £35. Viewdata software, £25; Datatel viewdata host software, £75.

Electron
Interface card (viewdata is monochrome), Nightingale modem and software, from Pace.

QL
Q-Connect RS232 interface, Q-Com V.23 modem, Q-Call dial-answer unit. Modules are available from Tandata Marketing separately or as a package. Price for all three is £199.99.

Spectrum
Miracle Technology Data-spectrum interface and software, V.21, V.23, £45.94.
Prism VTX 5000 viewdata modem, from Modem House, £70; user-to-user software, £4; Ascii software, £7.
Viccom modem, V.21, V.23, Bell modes, £79: interface card, cable and viewdata software, £20.
From Modem House: micro-packs with modem, software and leads for BBC (£90); Commodore 64, £100; Dragon 32 and 64, £80; Einstein, £100; Tandy models I and III, £100; and many other home and business machines.

Databases

To give a list of all the services you can dial up up would be impossible, new ones are starting up all the time. Bulletin Boards especially are booming.

These services fall into two main categories, databases and electronic mail services. This distinction is becoming somewhat blurred as Telecom Gold has lots of information and Prestel has a message service.

The most common use of a modem in this country is for accessing Prestel. The major attraction for the home computer user is Micronet, and its rival service Viewfax. Micronet is the more established service and offers software for the most popular machines, some of which are free. It also features the infamous chatline where some celebrity sits waiting patiently for questions to come through while the system goes down.

Other features are a micro-news service including the inimitable Steve Gold as the Micromouse. There is a "jungle" section which allows people to upload queries, advice and general chat onto the system.

Viewfax is a new rival to Micronet and appears to duplicate many of its features. It also has a new downloading system for Amstrad users.



Prestel's main problem is it is very hard to get any useful information out of. You can either get to a page by entering a specific page number, or by going from one page to another. There is no index in the old fashioned sense, and it is impossible to ask for a page on, say, Commodore music programs.

There is also very little information on routing, ie what the next page is about. But, for all its faults, it probably has more pages of interest to most micro users than any other system.

For the games player, apart from downloading software, Prestel offers two possibilities. Diplomacy, a well known proprietary board game is played on the Pan-Am information area, and Starnet has finally got off the ground.

Starnet is based on a game played by post called Starlord. Started in the late seventies, players would post in their orders which would be processed on a PET, and the outcome of the moves would be printed out and sent to the players. The author, Miss Singleton, of Lords of Midnight fame, has converted the game to run on Prestel. Moves occur every day or so and cost 25p. Your object is to become Emperor of the Galaxy (and stay that way). The catch is that 499 other players are trying to do exactly the same thing. Naturally this opens up all sorts of possibilities for Machiavellian tactics and skullduggery.

Compunet is a rival network to Prestel. It is dedicated to Commodore owners, although there are plans to open up some sections to other computer users. To use it, you must have the Commodore modem. This has a built-in 10 which helps prevent hacking. The system is a little more complex to use than Prestel, but once you get the hang of it, relatively straightforward.

There is certainly far more on the system of interest to the Commodore user than Prestel. The software you can buy includes most of the current best sellers — the packaging can if necessary be sent through the post. The system is capable of handling both text and graphics. Its major advantage over Prestel is the method of routing. Once again, you can either use page numbers, or use routing pages, but more information is given on the potential pages you can access, so you are more likely to get to a page you are actually interested in.

Compunet encourages participation by their subscribers

(continued on page 52)



THE 520ST. OVER QUAL

AVON BRISTOL
Computer Exchange.
AVON BRISTOL
Laskys.
AVON BRISTOL
Radford Hi Fi.
BEDS BEDFORD
Bedford Computers.
BEDS LUTON
Hobbyte Ltd.
BEDS LUTON
Laskys.
BELFAST
CEM Micro-Computer Services Ltd.
BELFAST
Computer All Ltd.
BELFAST
Education Company Ltd.
BELFAST
Ideal Radio.
BELFAST
N.P.O.
BERKS READING
HMV Micro Shop.
BERKS. READING
Laskys.
BERKS SLOUGH
Laskys.
BERKS SLOUGH
Silicon Chip.
CAMBS CAMBRIDGE
Cambridge Computer Store.
CAMBS CAMBRIDGE
Laskys.
CAMBS PETERBOROUGH
Laskys.
CENTRAL FALKIRK
Microplus.
CHESHIRE CHESTER
Laskys.
CHESHIRE CREWE
Woottons TV.
CHESHIRE WARRINGTON
Warrington All Computers.
CHESHIRE WILMSLOW
Fairhurst Instruments Ltd.
CLWYD WREXHAM
Micro Computer World.
CLWYD WREXHAM
Micro Computer Centre.
CO.DERRY
Donaghy Brothers.
CO. DOWN WARREN POINT
Visions Video.
CO. DURHAM
DARLINGTON
Darlington Computer Shop.
DERBYSHIRE
CHESTERFIELD
F.A.W. Electronics.
DEVON EXETER
Laskys.
DEVON PLYMOUTH
Laskys.
DEVON PLYMOUTH
Syntax Ltd.
DORSET BOURNEMOUTH
Lansdowne Computer Centres.
DORSET POOLE
Lansdowne Computer Centres.
ESSEX COLCHESTER
Colchester Computer Centre.
ESSEX COLCHESTER
Capricorn Computers.
ESSEX COLCHESTER
Laskys.
ESSEX HARLOW
Achter Instruments Ltd.
ESSEX HARLOW
Laskys.
ESSEX ROMFORD
Laskys.
ESSEX SOUTHEND
Laskys.
ESSEX SOUTHEND
Estuary Computers.
ESSEX WESTCLIFF-ON-SEA
Sterling Resources.
FIFE GLENROTHES
Computer Services (Scotland) Ltd.
GLOUS CHELTENHAM
Laskys.
GLOUS GLOUCESTER
Laskys.
GRAMPIAN ABERDEEN
Laskys.
GRAMPIAN ABERDEEN
Microshack.
GT. MANCHESTER BOLTON
Computer Annex.
GT. MANCHESTER
FAILWOODFIELD
Mighty Micros.
GT. MANCHESTER
MANCHESTER M4
Laskys.
GT. MANCHESTER
MANCHESTER M1
Laskys.
GT. MANCHESTER
MANCHESTER
Lewis's Ltd (Sound & Vision).
GT. MANCHESTER
MANCHESTER
NSC Computershops.
GT. MANCHESTER STOCKPORT
New Mills Micro Centre.
MERSEYSIDE LIVERPOOL
Lewis's Ltd (Sound & Vision).
GWENT EBBW VALE
Computability.
HANTS PORTSMOUTH
Microchoice.
HANTS SOUTHAMPTON -
AMS Systems Limited.
HANTS SOUTHAMPTON
Laskys.
HERTS ST ALBANS
Hobbyte Ltd.
HERTS WATFORD
Laskys.
HIGHLAND INVERNESS
Nova Computers.
HUMBERSIDE HULL
Golding Computer Services.
HUMBERSIDE HULL
Tommorrows World.
KENT BECKENHAM
Transform Ltd.
KENT BEXLEY HEATH
Laskys.
KENT BROMLEY
Laskys.
KENT MAIDSTONE
Kent Microcomputers.
KENT MAIDSTONE
Laskys.
KENT ORPINGTON
Lever Computers.
KENT SEVENOAKS
Chalk Hill Computers & Office Supplies.
KENT SWANLEY
Swanley Electronics.
KENT SIDCUP
Silica Shop.
KENT WELLING
K.E.C.M. Computers.
LANCS ACCRINGTON
PV Micros.
LANCS BLACKPOOL
Lewis's Ltd (Sound & Vision).
LANCS BOLTON
Computer World.
LANCS BURNLEY
Bytes And Pieces.
LANCS DARWEN
Grahams Micro Shop.
LANCS LANCASTER
Castle Computers.
LANCS LANCASTER
Online Computer Services.
LANCS OLDHAM
Home & Business Computers.
LANCS PRESTON
Lasky's.
LEICS HINCKLEY
Leigh Computer Systems.
LEICS LEICESTER
Dimension Computers.
LEICS LEICESTER
May's Hi Fi Ltd.
LEICS LEICESTER
Lewis's Ltd (Sound & Vision).
LEICS LEICESTER
Laskys.
LEICS LEICESTER
Data Nest.
LINCS GRANTHAM
OakLeaf.
LONDON BROCKLEY
Homeview Video.
LONDON NW4 Laskys.
LONDON NW5 Zoomsoft.
LONDON SW13 LEWISHAM
Laskys.
LONDON W5 EALING
Laskys.
LONDON W9 MAIDA VALE
Micro Monde Ltd.
LONDON W1 Compufase Ltd.
LONDON W1 Laskys.
LONDON W1 Laskys.
LONDON W1 Micro Anvika.
LONDON W1 Silica Shop.
LONDON W1 Selfridges.
LONDON W1
Computers of Wigmore St.
LOTHIAN EDINBURGH
Laskys.
LOTHIAN EDINBURGH
Silicon Centre.
LOTHIAN EDINBURGH
The Games Master Ltd.
MERSEYSIDE LIVERPOOL L1
Laskys.
MERSEYSIDE LIVERPOOL L2
Laskys.
MERSEYSIDE SOUTHPORT
Central Studios.
MERSEYSIDE ST HELENS
Microman Computers.
MIDDLESEX ENFIELD
Jennings Stores Ltd.
MIDDLESEX ENFIELD
Laskys.
MIDDLESEX NORTHWOOD
Screens.



THE ATARI 520ST Personal Computer has a list of qualifications as long as your arm. With a powerful 16 bit processor and 512k of memory linked to high resolution graphics and 512 colours its work is fast, clear and sharp on your screen, no matter how demanding the task.

Controlling the 520ST is easy through its mouse and unique operating system incorporating GEM desk top manager, whilst its eleven peripheral connectors including MIDI interface enables it to mix and communicate easily with other computer products.

The ST which presents itself in smart modern styling comes with powerful BASIC plus Logo programming languages, a word processor and drawing programme, yet costs only £652* including disc drive and black and white monitor.

Why? Because at Atari we bring up our products to work hard for their living.

IFIED AND UNDERPAID.

MIDDLESEX PINNER
P & H Micro.
MIDDLESEX RUISLIP MANOR
Intech Software Ltd.
NORFOLK GT. YARMOUTH
The Micro Shop.
NORFOLK NORWICH
Tetranite (Spectrum).
N. YORKSHIRE YORKS
Laskys.
N. YORKSHIRE YORK
Microbridge.
N. YORKSHIRE YORKS
York Computer Centre.
N. YORKSHIRE RIPON
Arthur Yates Ltd.
NOTTS HUCKNALL
S P Electronics.
NOTTS MANSFIELD
Mansfield Computers.
NOTTS NOTTINGHAM
Intoto.
NOTTS NOTTINGHAM
Laskys.
NORTHANTS NORTHAMPTON
Laskys.
NORTHANTS NORTHAMPTON
Northampton Home Computers.
NOTTS REDDINGTON
GA Computers.
OXON HEADINGTON
Maddison Computers.
OXON OXFORD
Laskys.
OXON OXFORD
Selfridges.
ORKNEY STROMNESS
Get Taped.
PERTHSHIRE BLACKFORD.
Silicon Glen Ltd.
SHETLAND LERWICK
Tomorrows World.
S. GLAMORGAN CARDIFF
Cardiff Micro Computers.
S.GLAMORGAN CARDIFF
Laskys.
S. GLAMORGAN CARDIFF
South World Computers.
S. YORKSHIRE DONCASTER
Danum Computer Systems.
S. YORKSHIRE ROTHERHAM
Rotherham Computer Centre.
S. YORKSHIRE SHEFFIELD
Just Micro.
S. YORKSHIRE SHEFFIELD
Laskys.
STAFFS. STOKE-ON-TRENT
Lewis's Ltd (Sound & Vision).
STAFFS. STOKE-ON-TRENT
Town Computers.
STRATHCLYDE GLASGOW
Laskys.
STRATHCLYDE GLASGOW
Lewis's Ltd (Sound & Vision).
STATHCLYDE GLASGOW
Unitsoft.
SUFFOLK SUDBURY
Sudbury Microsystems.
SURREY CROYDON
Laskys.
SURREY FARNHAM
Farnham Computers.
SURREY GUILDFORD
Laskys.
SURREY KINGSTON
Laskys.
SURREY LEATHERHEAD
Evergreen Ltd.
SUSSEX BRIGHTON
Brighton Computer Exchange.
SUSSEX BRIGHTON
Brighton Computer Centre.
SUSSEX BRIGHTON
Laskys.
SUSSEX CRAWLEY
Laskys.
SUSSEX WORTHING
Data Direct.
TAYSIDE DUNDEE
Cursor Keys.
TAYSIDE DUNDEE
Micromania.
TAYSIDE PERTH
VICS.
TYNE AND WEAR GATESHEAD
Currie & Maughn.
TYNE AND WEAR
NEWCASTLE UPON TYNE
Laskys.
WARWICKS LEAMINGTON SPA
Spa Computer Centre.
WARWICKS NUNEATON
Micro City.
WARWICKS NUNEATON
Warwick Computers.
W. MIDLANDS BIRMINGHAM
Lewis's Ltd (Sound & Vision).
W. MIDLANDS BIRMINGHAM
Software Express.
W. MIDLANDS BIRMINGHAM
Laskys.
W.MIDLANDS BIRMINGHAM
Lee Computers.
W. MIDLANDS COVENTRY
Coventry Micro Centre.
W. MIDLANDS COVENTRY
Laskys.
W. MIDLANDS DUDLEY
Central Computers.
W. MIDLANDS
WOLVERHAMPTON
Laskys.
W. MIDLANDS
WOLVERHAMPTON
Micro Business Centre.
WORCS KIDDERMINSTER
Central Computers.
WORCS REDDITCH
Ampower Video and Computers.
W. GLAMORGAN SWANSEA
Bucon Ltd.
WEST LOTHIAN
LIVINGSTONE
Computer Centre.
W. YORKSHIRE BRADFORD
CNA Computing.
W. YORKSHIRE HALIFAX
Abacus Computers.
W. YORKSHIRE
HECKMONDWIKE
Thought & Crosses.
W. YORKSHIRE
HUDDERSFIELD
Microworld.
W. YORKSHIRE LEEDS 12
Farnells.
W. YORKSHIRE LEEDS 6
Interface Engineering Ltd.
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Laskys.
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Micropower.

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Databases

(continued from page 49)

with a large "jungle" area, as well as a mailbox service. The Commodore modem has quite advanced software such as off-line editors, and simple load, save and print routines.

Possibly Compunet's major fault is speed. It uses a complex error checking system which ensures that a transmitted page is fully error checked. However, this all takes time, and a page takes roughly three times as long to be received as Prestel. A major attraction for software retailers is that downloaded software is essentially "donglised" ie it will only run on a computer with the same modem in place.

Computer shopping

Another section of Compunet is Comp-U-Store on line. This is the computerised branch of a discount shopping scheme Comp-U-Card, which has rented space on the Compunet system. Apart from trying to offer the lowest prices to its customers, Comp-U-card's idea is to offer unbiased advice to its members in order to help them with potential purchases. Comp-U-Store works in much the same fashion, but instead of speaking to a salesman, you simply interrogate a database. You key in the features you would like for a particular product, and the system comes up with a list of models which satisfy the criteria, then if you are happy, you can go ahead and order.

This database contains information on 22,000 products. Membership is £20 a year (over and above the Compunet membership) but the company believes that most people will save this amount of money on purchases, plus the added convenience of free delivery. There are plans to make Comp-U-Store available on Prestel in the near future.

Jungle chess

As far as the games player is concerned, there is the Compunet MUD (Multi User Dungeon) game, plus several games like chess carried on in the jungle and message areas.

MUD has also recently become available on its own from BT and MUSE (Multi User Entertainments). It now seems that at last MUD II as it is known has overcome its teething trouble. MUDD II was described recently in YC October 85. Principally, the difference between the MUD offered on Compunet and by MUSE is that MUD II from MUSE is far larger, with a larger number of spells, objects and monsters. However, it will only be available outside office hours, whereas Compunet MUD is available at all times.

MUD II's teething problems were caused when it was found that MUDL, the language MUD is written in, did not get on well with the new version of the operating system running on the Vax machines at one of BT's brand new computing centres. If these have at last been overcome, this should be well worth investigation.

There is a large number of companies offering electronic mail. The major advantage of sending a letter by electronic mail rather than a Prestel mailbox is, firstly, the message is not chopped up into a series of frames, and also there are more ways to manipulate passages than the first in, first out method of Prestel.

Telex gateway

Most services offer more than just straight electronic mail, where you send a message to another subscriber on the system and they read it when they next log on. Most offer a telex gateway, including acknowledging successful transmission. Some offer ordinary mail services — more useful for business men sending circulars, and others run a courier service.

Telecom Gold has expanded rapidly recently to the point where the differences with Prestel seem small. It hosts databases, usergroups and noticeboards. There were problems when this system started. For instance, entries to the index were not checked well, so most people ended up under "M" for mister.

Another problem was caused when it was realised that BT could be liable for any obscene content of messages placed on public noticeboards. The dirty word checker was not, however, the most advanced piece of software ever written, so perfectly harmless treatises on the demise of the wild bluetit suffered terribly at its hands.

Bulletin boards are a new growth area. They have been called the CB of the eighties, and like CB, most of the boards you can access have little of interest, and you can spend a lot of minutes on-line finding this out. Covering every subject from blue jokes to red politics you may find something to your taste. Some use a ringback system. You ring the number once, let it ring once and then put the phone down. You then ring up again and the computer should answer.

Speak to the sysop

If you let the number keep ringing the first time, you'll probably get through to the sysop. This system, while irritating, avoids tying up a phone line just for the board.

There is certainly no shortage of information you can dial up. Just remember your phone bill. Most common software will allow you to store Prestel frames or record entire calls to bulletin boards. Use this facility to the full to get in and out quickly and absorb the information later at your leisure.

SERVICES	MONODATA	COMET	EASYLINK	ONE—TO—ONE	TELECOM GOLD	PRESTEL	COMPUNET
Telex-send	Yes	Yes	Yes	Yes	Yes	Yes	No
Receive	Yes	Yes	Yes	Yes	Yes	Yes	No
E-Mail	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Letter	No	Yes	No	Yes	No	No	Yes
Database	No	No	No	Yes	Yes	Yes	Yes
Notice board	No	Yes	No	Yes	Yes	Yes	Yes
Radio paging	Yes	No	No	Yes	Yes	No	No
CHARGES							
Telex send (characters)	35p/400	14p/400	25P/400	20p/400	22p/400	40p/400	N/A
Telex reply Instant Mail	45p	Nil	Nil	Nil	50p	N/A	N/A
No. of free messages	No limit	500	50	No limit	No limit	No limit	N/A
Connect Time	Free	Free	10p/min	10p/min	3.5p/min off 10.5p/min peak	free off peak 6p/min peak	free off peak 6p/min peak
Registration + £10.00/mbx	£40.00	Nil + £10.00 1stMbx	£30.00	£50.00 Corp £300	Club £40 Corp £76	Club £26 £40 Standard	£30 beginner
Mbx Rental	£60 1st Mbs £30 thereafter	£360.00	£155.40	Nil	£120.00	Nil	Nil
Minimum monthly invoice	N/A	£30.00	£12.00	£5.00	£10.00	N/A	N/A
Contact No.	01-404 5014	0527 28515	01-633 9577	01-730 1155	01-403 6777	Freefone 2296	01-965 8866

ATARI ST



ATARI 520ST SPECIFICATION

MEMORY
512K RAM (524,288 bytes)
16K ROM expandable to 320K
Port for addnl 128K plug-in ROM cartridges
200K TOS operating system

GRAPHICS
Individually addressable 32K bit-mapped screen with 3 screen graphics modes
320x200 pixels in 16 colours (low resolution)
640x200 pixels in 4 colours (med resolution)
640x400 pixels in monochrome (high res)
16 shades of grey in low res mode
512 colours available in low/medium res
8 levels of each in red, green and blue

ARCHITECTURE
4 custom designed chips:
GLUE Chip - MMU Memory Mngmnt Unit
DMA Controller - Graphics Processing Unit
16/32 bit Motorola 68000 processor at 8MHz
eight 32 bit data registers
eight 32 bit address registers
16 bit data bus/24 bit address bus
7 levels of interrupts/56 instructions
14 addressing modes/5 data types

DATA STORAGE
High speed hard disk interface
Direct memory access 1.33 Mbytes per second
CD (Compact Disc) interface
Built in cartridge access
Dedicated floppy disk controller

DISK DRIVE
500K (unformatted) s/sided 3½" floppy d/drive
349K (formatted) storage capacity

SOUND AND MUSIC
Sound Generator
Frequency control from 30Hz to above audible
3 voices (channels) in wave shaping sound in addition to a noise generator
Separate frequency and volume controls
Dynamic envelope controls
ADSR (Attack, Decay, Sustain, Release)
Noise generator
MIDI interface for external music synthesizers

KEYBOARD
Separate keyboard microprocessor
Standard QWERTY typewriter styling
Ergonomic angle and height
95 keys including 10 function keys
Numeric keypad — 18 keys including ENTER
One touch cursor control keypad

MONITOR
12" screen - high res monochrome monitor
640x400 monochrome resolution

VIDEO PORTS
Display - Low Resolution - 40 columns
Med/High Res - 40/80 plus cols
Medium res RGB (Red/Green/Blue) output
High resolution monochrome (Black & White)

COMMUNICATIONS
Bidirectional centronics parallel interface for printers, or modems capable of input/output
RS232C serial modem/printer interface
VT52 Terminal Emulation Software
Maximum Baud Rate up to 19,200
High speed hard disk interface
Floppy disk controller (Western Digital)
2 joystick ports (one for 2 button mouse)
MIDI interface for external music synthesizers

GEM WIMP ENVIRONMENT
WIMP - Window Icon Mouse Pop-down menus
Two button mouse controller
Icons/Pull down menus/Windows
GEM VDI - Virtual Device Interface
GEM AES - Application Environment Services
GEM BBT - Bit Block Transfer
Real time clock & calendar

SOFTWARE
GEM environment
with user friendly Macintosh style operation
'TOS' - Tramiel Operating System
Atari's own system based on CP/M 68K, with hierarchical directory & file structure plus a host of MS DOS & UNIX command structures
'BOS' - Business Operating System
to run any standard BOS business programs
GEM desktop
with GEM PAINT graphics mgmt system and GEM WRITE word processor
Personal BASIC and DR Logo
originally written by Digital Research (DR). Very much like those on other machines except for the extensive use of pull down menus, mouse control and windows

VARIOUS
Dimensions: 470mmx240mmx60mm
Replaceable external power supplies
Expansion: 3½" floppy disk drives 500K/1,000K (two drives can be connected)
3½" 15Mb hard disk
CD (compact laser disc)
Dot matrix & d/wheel prntrs (black)
Thermal dot matrix (colour)
RGB & monochrome monitors

LANGUAGES
BASIC & LOGO supplied
Many others will soon be available, including: Assembler, BCPL, C, Cobol, Compiled Basic, Lisp, Modula-2 and Pascal

Note: Some of the above specifications are pre-release and may therefore be subject to change

MACINTOSH v F1e v 520ST

"Imagine a Fat Mac - the 512K Apple Macintosh - but with a bigger screen, a far bigger keyboard with numeric keypad, cursor and function keys, and colour. That gives you some idea of what the Atari 520ST is like, except for two important things. First the Atari seems faster. Second the Atari system is about one third of the price."
June 1985 - Jack Schofield - **PRACTICAL COMPUTING**

FEATURES OF BASIC SYSTEM	APPLE MACINTOSH	APRICOT F1e	ATARI 520ST
Price includes B/W Monitor	YES	NO - extra £200	YES
Keyboard size mm (LxDxH)	330x147x50	450x167x28	470x240x60
Keyboard size ins (LxDxH)	13x5¾x2	17½x6½x1	18½x9½x2½
3½" D/Drive (Unformatted)	500K	500K	500K
3½" D/Drive (Formatted)	399K	315K	349K
WIMP (Window, Icon, Mouse ...)	Apple	ACT - Activity	GEM
Real-time Clock	YES	YES	YES
Polyphonic Sound Generator	YES	NO	YES
RS232 Serial Port	YES	YES	YES
Centronics Parallel Printer Port	NO	YES	YES
Dedicated Floppy Disk Controller	NO	YES	YES
Hard Disk DMA Interface	NO	YES	YES
Full stroke keyboard	YES	YES	YES
Number of keys on keyboard	59	92	95
Numeric Keypad	NO	YES (16 Keys)	YES (18 keys)
Cursor Control Keypad	NO	YES	YES
Function keys	NO	10	10
16-bit processor	68000	Intel 8086	68000
Processor running speed	8MHz	4.77MHz	8MHz
RAM size	512K	256K	512K
Number of graphics modes	1	4	3
Number of colours	Monochrome	16	512
Max Screen Resolution (pixels)	512 x 342	640 x 256	640 x 400
Mouse included	Single Button	NO - extra £95	Two Button
Replaceable External Power Pack	NO	NO	YES
Cartridge Socket	NO	NO	YES
Joystick Ports	NO	NO	YES (two)
MIDI Synthesiser Interface	NO	NO	YES
Monitor Size	9"	9" - extra £200	12"
RGB Video Output	NO	YES	YES

System Cost with: Mouse - Monochrome Monitor - 512K RAM - 500K Disk Drive

Price of basic system (exc VAT)	£2595+VAT	£595+VAT	£652+VAT
+ Mouse	Included	£95+VAT	Included
+ Monochrome Monitor	Included	£200+VAT	Included
+ Expansion to 512K RAM	Included	£295+VAT	Included
Price of complete system (exc VAT)	£2595+VAT	£1185+VAT	£652+VAT
PRICE rounded down including VAT	**£2,984**	**£1,362**	**£749**

520ST

POWER WITHOUT THE PRICE

THE NEW ATARI 520ST

Under the new leadership of Jack Tramiel (former boss and founder of Commodore Business Machines), Atari Corporation have marked their entry into the world of business/personal computers with a machine which leaves the competition standing. Tramiel's slogan 'Power Without the Price' has been implemented in the manufacture of the new 512K Atari 520ST colour computer which offers the user amazingly high performance at an incredibly low price. Launched as a work-station, this new system incorporates seven software packages as well as the 520ST computer with 512K RAM, mouse controller, high resolution monochrome monitor (640x400), 95 key keyboard (with 18 key numeric keypad), MIDI interface, GEM and a 500K 3½ inch disk drive, all for the package price of only £651.30 (+VAT = £749). Dubbed the 'Mac beater' and the 'Jackintosh' (after Atari's Chief, Jack Tramiel), Atari's new machine has been directly compared with the Apple Macintosh RRP £2595 (+VAT = £2985) which offers similar features and capabilities but at a much higher price. Favourably reviewed by the UK's highly critical specialist computer press, the 520ST is likely to make a great impact in this country as a sophisticated alternative to an IBM PC, APRICOT or APPLE MACINTOSH. Unlike its overpriced competitors, the Atari 520ST can be linked up to a colour monitor to unleash a choice of up to 512 colours. The addition of colour brings out the full potential of graphics packages such as GEM.

USER FRIENDLY GEM OPERATING SYSTEM

The power of the ST is harnessed and made user friendly by the new operating system 'GEM' from Digital Research. GEM stands for Graphics Environment Manager and allows a user friendly colour or B/W graphics interface which closely resembles that of the Macintosh. This similarity extends to the use of moveable resizeable windows, icons to represent objects such as disks and disk drives, and the use of pull down menus and a mouse. The advantage of all this is that the computer becomes extremely easy to use. GEM has now been implemented for the Acorn, ACT, Atari, IBM, ICL, and Olivetti. Software written for GEM on one computer should also run under GEM on another computer. This will enable the market to quickly produce a large library of standard interchangeable software.

FREE SOFTWARE AND FUTURE EXPANSION

The Atari 520ST comes supplied with seven free software packages as listed below: 1) TOS -Tramiel Operating System based on CPM 68K. 2) GEM Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment. 3) DR GEM Paint for creating graphics masterpieces. 4) DR GEM Write for word processing. 5) Logo learning language to enable you to write your own programs easily using turtle graphics. 6) DR Personal Basic a powerful user friendly version of the Basic programming language. 7) BOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3½ inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disk (CD) player capable of storing an entire 20 volume encyclopedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

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- ★ **KEYBOARD (95 KEYS)**

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PRESS COMMENT

"Atari's new corporate image as an aggressive low cost computer maker is likely to mirror that of Commodore where Mr. Tramiel established the maxim that 'Business is war'."
August 21st 1984 **FINANCIAL TIMES**

"This is the only personal computer I know of that comes with a Midi interface as standard."
Peter Bright March 1985 **PERSONAL COMPUTER WORLD**

"The (GEM) version running on the Atari 68000 machines will have the additional advantage of leaving the PC version standing." April 6th 1985 **PERSONAL COMPUTER NEWS**

"It would seem that GEM offers the ideal operating system."
March 7th 1985 **POPULAR COMPUTING WEEKLY**

"I found it (GEM) extremely easy to use and was very impressed with the way in which it disguises the unfriendly hardware and operating systems lurking under the surface."
Peter Bright Feb 1985 **PERSONAL COMPUTER WORLD**

"The electronics in the machine are a work of art ... The heart of the 520ST is a Motorola 68000, one of the most powerful 16-bit processors around and in many respects it is close to being a 32-bit chip ... when the machine appears in the shops, I'll be at the front end of the queue to buy one."
Peter Bright June 1985 **PERSONAL COMPUTER WORLD**

"This machine is significantly more powerful than an IBM PC ... If it's possible to design a pure-fire winning machine, this is it." May 11th 1985 **PERSONAL COMPUTER NEWS**

"... the use of GEM makes the new range of Atari computers so similar to the Macintosh (with the added attraction of colour), that they are already being called 'Jackintoshes'."
May 2nd 1985 **COMPUTING**

"The new Atari ST computers truly represent to the consumer what Jack Tramiel is saying — easy-to-use computing power without the price." March 1985 **ANALOG COMPUTING**

"It (the ST) uses the most modern technology that is affordable, in a package that gives a professional impression."
May 23rd 1985 **POPULAR COMPUTING WEEKLY**

"The Atari ST is one of the most elegant designs I have seen ... Atari has used an original and elegant method of memory management which should make the ST faster than any other PC on the market - in any price bracket ... The 64K dollar question is would I go out and spend money for one? To which the only answer is 'Try and stop me!'"
John Lambert July 1985 **ELECTRONICS & COMPUTING**

"The 520ST is technically excellent ... The 520ST hardware is the new standard by which others will be judged."
July 1985 **YOUR COMPUTER**

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If so, which one do you own?

The Generation



A quick peek at one of the screens from Ransom, a demo game that comes on the GAC disc. If you've got inky fingers, this program will really let you make your mark!

Adventures have been with us since the very earliest days of computer gaming and have fluctuated in popularity over the last few years. But in the last few months four quite separate events have taken place that are bound to have an enormous effect on adventuring for anyone who's ever bested a Balrog or combed the hair between their toes.

The first event was Level 9's release of Worm in Paradise. This game is the first written using Level 9's new adventure programming system and raises the art of the cassette-based game to new heights, offering an unbeaten 1,000-word vocabulary and a very clever parser.

New standards

Then came Lord of the Rings from Melbourne House. Although the Spectrum version is rather slow, this program still sets new standards for cassette adventures in terms of the interactive characters in the program. Philip Mitchell, chief programmer on the Rings project, was the programmer of the Hobbit, which must take a great deal of credit for the ensuing growth in popularity of adventures. LOR is a tremendously ambitious piece of programming that will give plenty of other software houses something to keep up with.

The third event, not quite so apparent as the other two, was the release of Infocom games for the Amstrad CPC computers. Up until now British software developers have been hampered by the punters' reliance on cassette loading, but now Amstrad look like being the first eight-bit home micros to establish a decent disc standard for their machines.

The Infocom games run under CP/M, but at under £20 they're going to start making themselves felt in the marketplace, and it won't be long before other British software houses begin to take discs more seriously and move on to bigger and, hopefully, better games.

The fourth event, however, is possibly the most explosive of all. Again, it's gone quite unnoticed amongst owners of machines other than Amstrads, since at the moment the program in question runs on these machines only. However, Spectrum, Commodore, and hopefully BBC versions are planned for the spring . . . and then, all hell will break loose!

The program is called Graphics Adventure Creator; it's from Incentive Software, and it offers the unskilled programmer the chance of producing a really professional game.

Room for adverbs

GAC offers the following options to the user — multiple entry commands; whole sentence input — rather than just verb/noun; a theoretical maximum of 2,000 locations; text-compression, so you can fit more in; multi-colour graphics with a merge facility; room for over 758 vocabulary entries, which can consist of verbs, nouns, *and* adverbs.

In other words, it looks as if it can offer the sort of facilities that should make writing a professional looking game a piece of cake — provided, of course, that you can supply the ideas.

The program is menu-driven, and you can see the main menu in the screen-shot on the right. Selecting the graphics option throws you into a stand-alone graphics utility that offers some very attractive features. Not only do you get "rubber-banding" — that means dragging a line around prior to fixing it in place — but you also get elipse and box drawing together with a stippled fill command. Another very important feature

WHY THE BIG BOYS USE GENERATORS

Just in case you think it's cheating to write an adventure using a generator program rather than coding it from scratch, just consider that Level 9, Scott Adams, Adventure International, Firebird, and Infocom have *all* produced games using generators. Of course most of these houses have designed their own generator software, but the principle of using a generator is widely accepted.

In fact, the nature of the games produced by software houses is dictated almost entirely by the generating software they have developed over the years for producing their games.

Each system has its own hallmarks. Infocom, for example, write their games in a specially adapted language derived from Lisp. This language is much used in artificial intelligence work, so it comes as no surprise to learn that Infocom games are particularly well known for the way in which they can understand complex inputs.

Level 9's system is hot on text-compression — the programs use huge dictionaries of words that allow the parser to find any word used by the game, even if it's only in a location description.

Adventure International's system is carefully designed to allow easy translation from one language to another so that they can sell their games in non-English speaking countries.

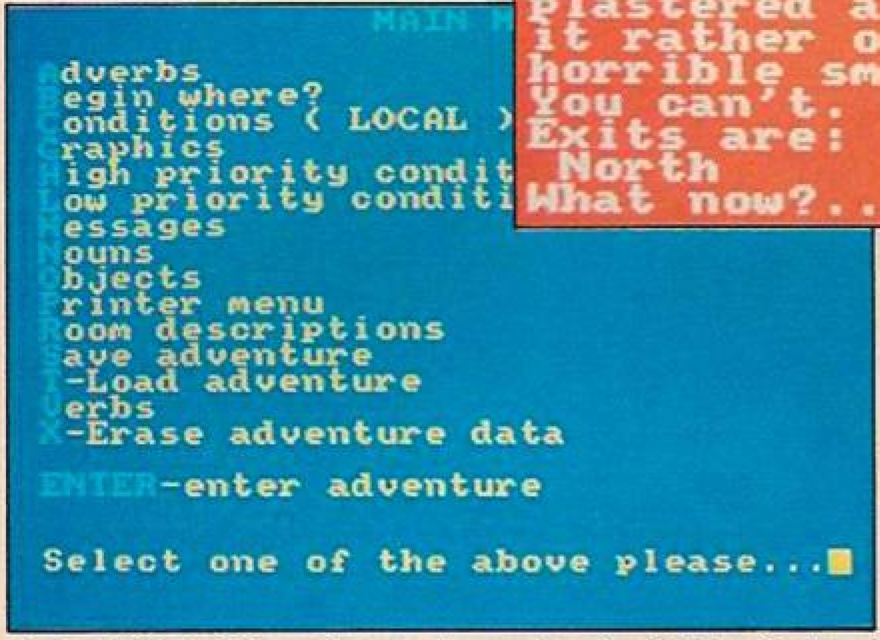
Melbourne House is the odd one out here, although both Hampstead and Terrormolinos were written using the Quill. It's to the credit of programmer Philip Mitchell that he has attempted to update his program system with each release, from the Hobbit through Sherlock to Lord of the Rings. That explains why he doesn't produce so many games, but it also guarantees that each one will be unique, introducing new game-play features and not just different stories using the same programming framework.

Game

Steve Cooke looks at an extraordinary new adventure generator program that leaves the Quill stuck in the ink-pot.



Other adventure houses are already jumping on the GAC bandwagon. This is a scene from The Beer Hunter from Global Software written using the Incentive program.



This is the main menu for GAC. The program is easy to use and comes with very readable documentation — a boon for novice adventure programmers.

is the ability to Merge pictures, so that in theory you can build up a number of different scenes from a range of pre-defined shapes or objects.

The graphics utility is fun to play with, and as you can see from the picture on the left it can be used to produce some very attractive looking displays indeed. However, what really sets GAC apart from the rest is the way it allows you to define the bare bones of your adventure — the commands and actions that go to build up the story.

Writing an adventure basically involves setting up three tables. A vocabulary table, which includes all those words that you want the program to understand; a message table, which specifies what strings are to be printed to the screen; and an action table, which includes the various routines for updating variables, selecting messages, and so on.

Linking these three tables together is the parser, a sub-program that accepts inputs from the player and encodes them in such a way as to allow the program to select an appropriate action from the action table and kick the whole shebang into activity. Generally, an adventure stands or falls by its plot and its parser, and providing you can supply the plot, GAC can give you one hell of a parser.

Parts of speech

Not only will GAC accept the verbs and nouns, but it will also allow you to set up a special "adverb" table. In fact, the table isn't strictly speaking for adverbs alone, but can also be used for prepositions like "in" or "on".

This means that GAC will allow you to cater for inputs like

Put the can on the table

and even allow you to follow that with something like

"Open it"

since the program allows the use of "it" to refer to a previously mentioned noun.

Sorting out inputs is obviously not a problem with GAC. However, the program also scores well on the amount of space left for the actions and room-descriptions that will be

HOW IT WORKS . . .

Here's a quick glimpse at how GAC works. Suppose you wanted to test to see whether a player had typed "Look" and if so print a description of the current location. This would need to be entered as:

IF (VERB 7) LOOK WAIT END

This example is typical of a GAC construction, in that it consists of an If statement, which checks a condition and then performs some actions. Special words are used for conditions and actions — Verb n, for example, tests to see if a specific verb has been entered.

In the above example, verb 7 would have previously been defined as Look, and perhaps also Redescribe, or even Search — you can assign a number of synonyms to each verb number, thereby saving yourself the trouble of checking for different entries that mean the same thing.

Look and Wait in the above example are special GAC action commands, the first describes the room and the second awaits a new description. Complex conditions can be built up using different condition key-words, such as Noun n, Carr n is object n being carried At n which returns true if At a specific location.

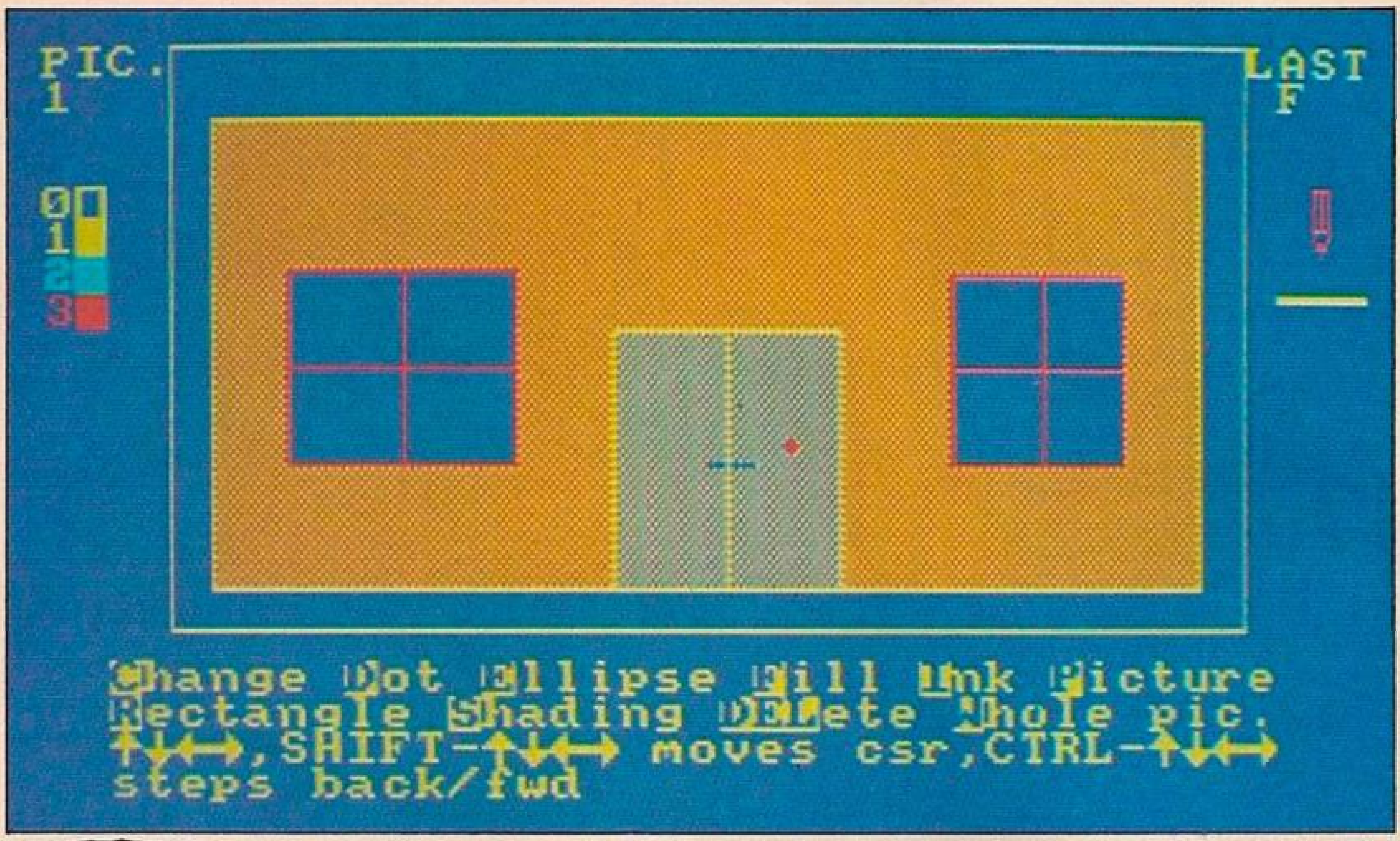
Similarly, complex actions can be performed by linking togehter action key-words such as Look and Wait above, or Goto n — move to location n — Find n — locate object n and go to it — and OBJ — describe object n.

There are approximately 38 different conditional structures and slightly more action key-words in GAC. However, many of these allow you to manipulate counters and flags, the purposes of which are defined by the user, so there is considerable flexibility here.

Furthermore, the key-word system makes GAC very easy to use, even if you're not very familiar with programming techniques. This is quite an advantage over the Quill which, although flexible in use, requires considerable study of the rather complex manual to get the most out of it.

(continued on next page)

The Generation Game



Here's a shot of the graphics utility in action. Rectangles, and stippled fill are available, plus a merge picture facility.

(continued from previous page)

called up by the player. First, you can have up to 238 messages together with 250 objects to collect. The number of messages is perhaps the only side of GAC that could have been expanded.

Although you can have "up to 2,000" locations, memory obviously imposes limitations and I for one would rather have seen, say, a 255 limit to locations but a more generous message allowance. That said, however, you can cheat here by defining messages as locations in their own right, but it would have been nice to see a bit more provision for text messages.

I've mentioned memory limitations, but really this is one area where GAC leaves all the other adventure generator programs standing. The program compresses all your text and can achieve compression rates approaching 45 per cent. This is really quite remarkable for a compact program such as this one and makes an enormous difference to the games programmer.

One of the big bugbears of the Quill was the Ram squeeze that ensued when you tried to go over about 80 locations, unless the descriptions were kept very short. GAC on the Amstrad, however, gives you 25K of free space, and allowing for compression that amounts to about 50K of text space.

If you don't believe me, just meditate on this a while — Incentive has just finished converting Mountains of Ket from the Spectrum to the Amstrad. They obviously have confidence in their product, since they used GAC to make the conversion and — wait for it — the 38K-plus Spectrum program came out at just over 15K under the GAC system, a compression rate of over 50 per cent.

So, if you've been lying awake at nights wondering whether to tackle machine code so that you can etch your fantasies onto silicon, forget it. Nearly all the successful adventure houses used adventure generator programs, and now there's one just round the corner for your machine that could set your imagination free!

Global's adventures — Magician's Ball, The Beer Hunter and Old Scores — have received considerable acclaim, so if an established software house like them uses GAC, you can be pretty sure it's good enough for you.

QUILL PLUS ILLUSTRATOR

The Quill plus Illustrator is difficult to compare directly with GAC. For a start, it's already available on most machines — the Beeb version is available very soon now — and secondly, Gilsoft has a policy of constantly updating its products, so Quill today isn't necessarily Quill tomorrow.

For example, Tim Gilbert has a text-compression program in the offing that will be compatible with existing Quills and should go a long way towards solving the age-old problem of Quiller's cRAMp! There's even a "super Quill" in the pipeline, but don't expect that to arrive on your doorstep for some time.

However, the Quill, despite its revisions and improvements, still suffers from its origins back in the days when text-input meant verb-noun and nowt else. It's true that you can still manage to do remarkable things with the Quill's parser if you persevere, but perseverance is the name of the game and the program demands a lot of work if you're going to create a game that will compete — in terms of complex input — with something written on GAC.

The best thing about the Quill, however, is undoubtedly the Illustrator. This program has a number of very powerful features, the most significant of which is the ability to create individual picture elements and then merge them together using different scales.

That means that a pre-defined tree could be looming large in the foreground in one picture, but shrinking away into the distance in another. This "scaled merge" facility is very powerful, not least in saving you memory as well as development time.

Once GAC appears on other machines, it's going to give the Quill a run for its money. Of that, there's no doubt. GAC is easier to use, combines text and graphics in one package, and is far cheaper and — most important of all — gives you more space.

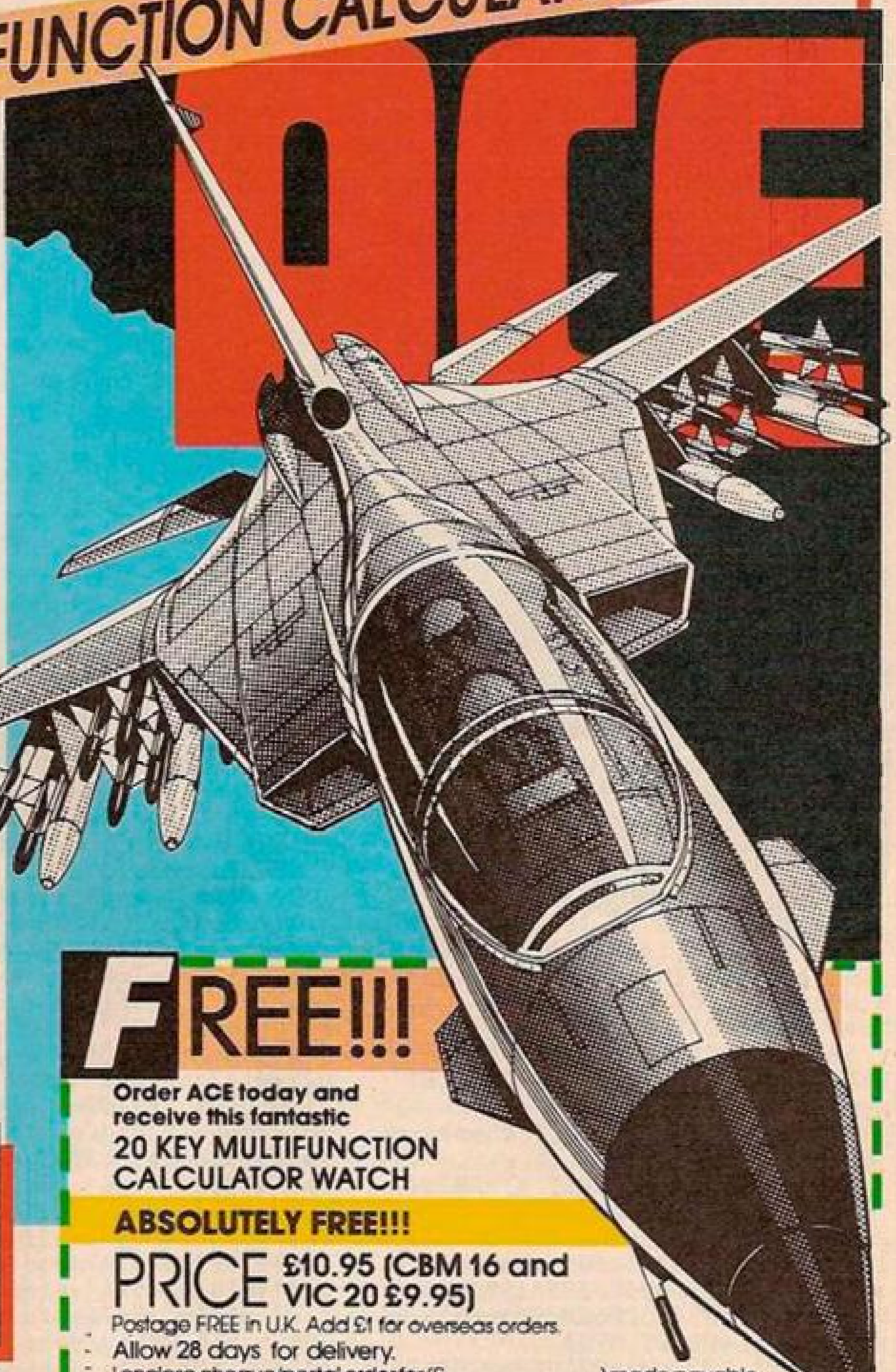
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* Note due to memory limitations ACE on the C16 and VIC20 (+8K Ram) do not have any ground objects.

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Screen shots are for CBM 64 version. Other versions may vary.

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Registered No. 1755554



cascade

Tapeworm

Tapeworm is a game for the 48K Spectrum, featuring colour and lots of sound. You are a hungry snake on the search for food, but only the red fruit is edible — the green mushrooms are poisonous!

Furthermore you also have to avoid bumping into the wall or into the dreadful spider that roams around the screen. Once your worm gets moving you can't stop it. The more you eat, the more difficult the game becomes, because your length increases.

When you're down to the last five pieces of fruit you'll see a door open at the top of the screen. Once you've chomped through the first screen you can move on to the second where there is even more to eat but also even more to avoid bumping into. The game can be controlled through the keyboard or with a Kempston joystick. There are three keys which perform a special function during the game:

- Caps shift — pauses the game
- Symbol shift — turns the background noise on/off
- Space — aborts the game.

Entering the game is not very difficult, but it's a lot of work and one single error could crash the computer. First, you have to enter listing 1. This is the machine code in hex data statements. Although every line is checksummed for security a checksum is not fool-proof so type with care.

When you have entered the whole listing you can run it. If you haven't made any errors, the program will just stop. Otherwise it will indicate at which line the error occurred so

Listing 2.

```
  10 PAPER 0: INK 7: BORDER 0: C
LEAR 29938
  20 PRINT AT 7.5;" TAPEWORM IS
LOADING ";AT 10.9;"PLEASE WAIT"
  30 FOR F=1 TO 5: BEEP .1,F
  35 NEXT F
  40 INK 0: LOAD ""CODE
  50 POKE 23675.168
  60 POKE 23676.233
  70 RANDOMIZE USR 6E4: STOP
  80
 100 SAVE "TAPEWORM" LINE 10
 110 SAVE "TAPEWORM CODE "CODE 5
9670.3200
 120 VERIFY "": VERIFY ""CODE
 130 STOP
```

Listing 1.

```
  10 DEF FN h(h$)=16
*FN i(h$(1))+FN i(h$(2)): DEF FN
 i(i$)=CODE i$-48-39*(i$>"9")
  15 CLEAR 59000
  20 LET x=59670: PRINT "pokina
data.please wait"
  30 FOR a=1000 TO 1630 STEP 10:
 PRINT "line ";a;: READ a$.t: IF
 LEN a$<>100 THEN  PRINT " lengt
h error": STOP
  40 FOR b=0 TO 49
  50 LET z=FN h(a$): LET t=t-z:
LET a$=a$(3 TO ): POKE x.z: LET
x=x+1: NEXT b
  60 IF t THEN  PRINT " checksum
 error": STOP
  70 PRINT " OK": NEXT a: PRINT
"finished.no errors"
 996 STOP
1000 DATA "05a205a605aa0aac05a20
aac000019861986068619861 98c068a1
98a068619860784328600000aa005920
a9205a005a405a0".3731
1010 DATA "059c0aa005920a9205a00
5a405a0059c0aa60aa405aa0aa605920
a92000005aa05ae05aa05a60aa40aa00
a9c0a9c149c0000".3856
1020 DATA "0c880c960c880c9606960
69a069e06a00c960c960ca00c960c960
c900692069006 8c06880c8c0c8c00000
00000000e314199".3417
1030 DATA "9941310e7e8181995a422
4181824425a9981817e708c829999828
c703c24e78181e7243c183c7effdb993
c7e24997e3cff3c".5482
1040 DATA "3cdb24997e18c31824c30
30408387c7c7c38071961f2f66f0f060
00081c3ff7e3c0040e2e7e7e747221c0
0010363910b669e".4716
1050 DATA "080e0e1e6385081000804
2c488d1667810707679c0b0080400014
223118b661e080e6e9e030d10200080c
0c689d066791070".3984
1060 DATA "7078c6a1100800030f1f3
f3f7f7f00ffffffffffffff00c0f0f8f
cfcfefecd32f23e0132a8f43216f421a
4582289f43e0232".6673
1070 DATA "a7f4c3eef4cd17eff3cdd
0ee3e01cdb1ec3a9df43c329df4e6032
01ccdbbea3e7fdbfe1fd2b2eb3efedbf
e1fd451ec79a7ca".8174
1080 DATA "b2ebfe0128d1cdd4f0300
5cd46ed18edcd10eb18caed4b7df4c5c
d7eeecd6eeec1c5fe0420033a81f4328
1f4cd3feeed437d".7554
1090 DATA "f4cd13ed3a81f4ed4b7df
4114700cdf3efc1110600 3e04cdf3ef1
145003e202a82f44e2346cdf3efcd33e
e0e023a88f4a7c0".6334
1100 DATA "cdf1ec0e02c93aa7f45f3
e7fdbfee60232a7f4200bbb28083aa8f
4ee0132a8f43aa8f4a7caa9eb2aa0f42
b22a0f47cb53aa2".6962
1110 DATA "f4200c3ce60332a2f4219
00122a0f4a7282dfe01283bfe0228302
aa3f47d84cda2eb30057ced4467856f2
2a3f47d2f0707e6".5597
1120 DATA "03f6085f16002601cdb50
3f3c93aa3f4c61932a3f46f18e33aa3f
43d3d18f32aa5f47d846fcda2eb30047
ced44676f22a5f4".6166
1130 DATA "18c7fe0fd8fef03fc9217
8052b7cb520fbc9cd41ec381821f5f30
10108114f013e1ecd4df03e02cdb1ecf
bcd8dedc9219ef3".6435
1140 DATA "11b9f3010600edb021c4f
3060836202310fb21ccf3010108114f0
13e1ecd4df03e03cdb1ecfb21eaf3010
90b114401 3e0bcd".4769
1150 DATA "4df0fdcb30de21c4f3011
40b111f013e08cd4df0cd9aeffdcb01a
efdcb016e28fa3a085cfe0dc8fe2038e
cfe8030e821c5f3".6612
1160 DATA "11c4f3010700edb01218c
9219ef311b9f306061abec0231310f9c
9cd67ec3efedbfe1f30f9afdbfe2fe61
f28f8cd67ecc921".6622
1170 DATA "0003110a00c5cdb503c1f
3c93a18f4a728083ef7dbfe2fe607c05
e2356237ba7c8e5d5cd282d3e32cd282
def0538f1cd282d".5757
1180 DATA "3e80cd282def03383e02c
d282def0538cdf803f3e118c32116e93
d28bdf57e2323a720faf118f3c5cdaaf
0c1ed4386f4fe14".6512
1190 DATA "3874fe173070e1c121dce
ce5c5c3dceaed4b86f43a81f411c700c
df3ef3e04cdb1ec0e01c9010f003e141
14000cdf3ef0110".6398
1200 DATA "003e15114000cdf3ef011
1003e16114000cdf3efc978a728aa3df
e163026793dfe1e3020cdaaf0feffc8f
e063816cd16eecd".5720
1210 DATA "c5ed2a82f42b2b2282f43
a88f43d3288f4c9e1c11804ed4b7df4c
de4edcdb2ed3a84f4010000a7e8cd75e
dcd96ed3e010667".7016
1220 DATA "2119f4772310fc3e03328
1f4cd8ded010200c9dd218ff4dd36000
0dde5cd29f1dde1dd360001dd360100c
92100002b7cb520".5464
1230 DATA "fbc92a82f4117df4e5a7e
d52e1d04e234623e51145003e20cdf3e
fe118e73a84f43d3284f4c61b4f06001
e083e20c3f3ef06".6242
1240 DATA "0521a2f37e34fe3920053
6302b10f50107001108003e06219ef3c
d4df0c93e145f1600f5c53a81f43ce60
33281f4d5110800".4659
1250 DATA "cdf3efd12110272b7cb52
0fbcd1deec1f1c60afe0a30d7110000c
d1deec911ffe0cd1deec93e00ee10d3f
e430520fd1d4f7a".6483
1260 DATA "bb7938f13e00d3fec9211
bf41119f4016400edb0c9fe0020010df
e01200104fe02200105fe0320010cfe0
4d83e00c90e00db".4796
1270 DATA "1fcb4fc00ccb57c00ccb5
fc00ccb47c00cc9fe04c83e0391473a8
1f4b879c03e04c93a16f4fe02280ccd9
6ee79fe04c0cdb9".6312
1280 DATA "ee79c9cd59ee79c90e003
edfdbfecb4fc80c3efedbfecb4fc80c3
efbdbfecb47c80c3edfdbfecb47c80cc
93ef70e00dbfecb".7679
1290 DATA "47c80ccb57c80ccb5fc80
ccb4fc80cc93a17f4fe1e30013c3217f
4d6053288f43e0106672119f4772310f
c2173f42282f4cd".5575
1300 DATA "2cef3e033281f4cd16f1d
d218ff4dd360001dd360100dd360264d
d360364210101229bf4c93e093217f40
606219ef3363023".4827
1310 DATA "10fb3e043284f4c9cda9e
fcdcdefcd7eef3a17f4473e05110400c
d53ef3a17f4473e06cd78f0c60611020
0cd53efc9c5f5d5".6436
1320 DATA "cd66efd1f1f5d5cdf3efd
```

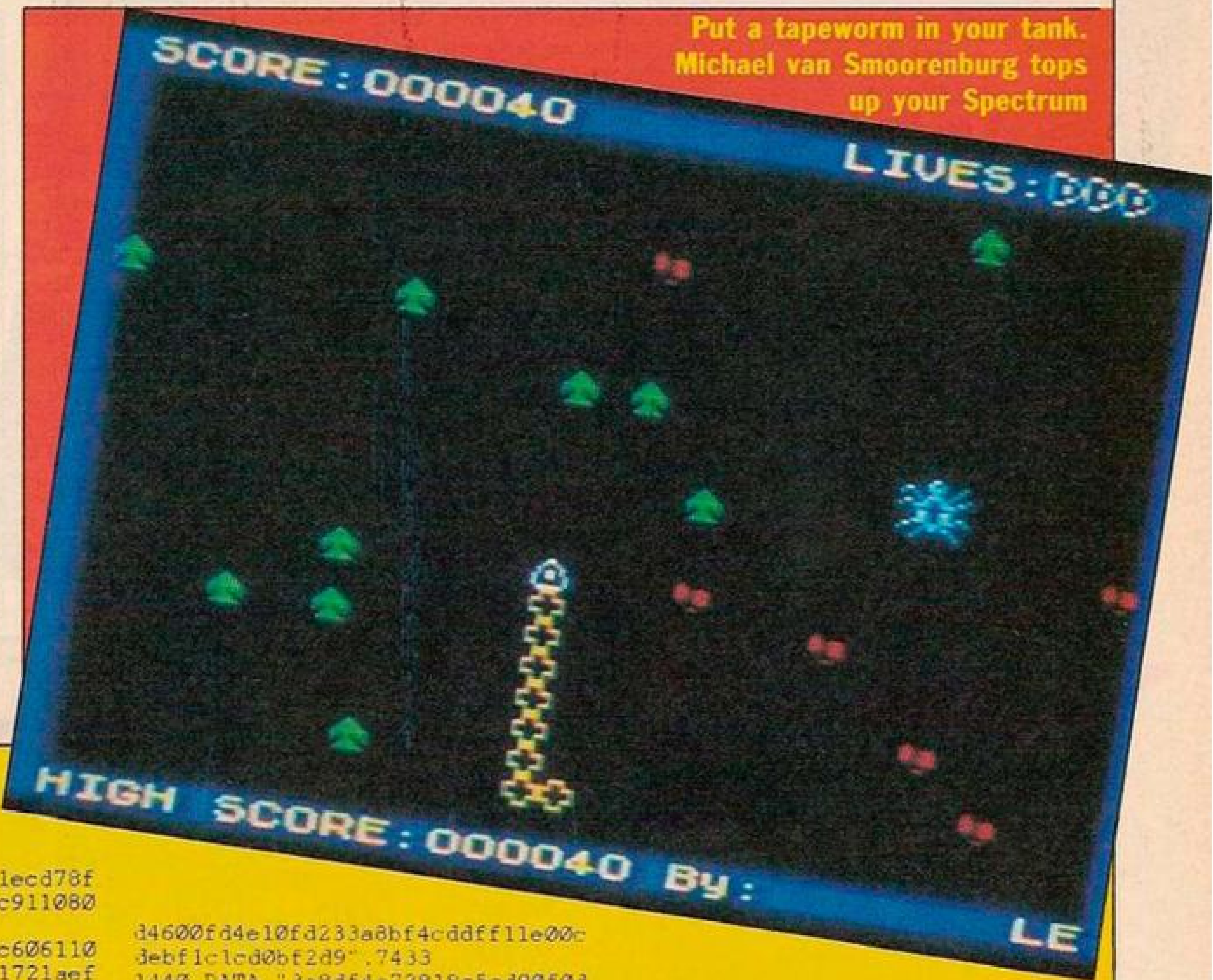
you can correct your mistake and try again.

If everything is correct, save the hexcodes for security and then type New. Now enter listing 2.

This is the complete Basic loader for the program. Goto 100 will save the completed program, then you have to rewind the tape because the program wants to Verify. Now for the moment of truth . . . Type Run 50. The program will start, give you a menu and play a nice tune. You can now play it if you wish.

As usual with long programs, there is a cassette tape available for those who don't want to spend their evenings typing in hex. Send £3 to M van Smoorenburg, Baljuwstraat 20, 2461 sl Langeraar, the Netherlands. Within a week or two you'll receive your copy of Tapeworm.

Put a tapeworm in your tank. Michael van Smoorenburg tops up your Spectrum




```
1f1c110eec93e15cd78f0473e1ecd78f
04f04040cc5cdaaf0c13c20e9c911080
00101002198f33e".6762
1330 DATA "0ccd4df03a84f4c606110
800011500cd4df011080001011721aef
33e1ecd4df0c921004011014036000 1f
f17edb021005811".4119
1340 DATA "015801ff023645edb03e0
0d3fe3e0732465cc921005811010006 1
fcdedef11200006 17cdedef11ffff061
fcdedef11e0ff06".5257
1350 DATA "17364e1910fbc9d5fe302
0023e4f26006fed5b365cfe203004ed5
b7b5c29292919ebcd82f0c1cb40281bc
d21f07cd608677d".5379
1360 DATA "c6206f06041a772477241
310f8e5cd3df0e1c906081a77241310f
a79fe08c8257c0f0f0fe603f658677ee
6b8b177c9c5d5e5".5746
1370 DATA "f57ecdf3eff1e1d1c10c2
33d20efc9e5c52a14f4e529292929292
9c1090129000922 14f47cc1e1c94fcd5
ff0b930fac9cf0a".6527
1380 DATA "79fe2030f978fe1830f42
640180d78e607c64067cb38cb38cb387
80f0f0fe6e0816f78e6188467c9cd82f
0ed5b7b5c0600e5".6054
1390 DATA "c50100080e001abe28010
c241310f779c1e1a72809 0476fe1738e
43cffc978c9dd218ff4cd29f130063a1
8f4a777c82a9bf4".5457
1400 DATA "3a21f4853291f4fe09360
4fee738047ded446f3a92f4843292f4f
e093804fea838047ced4467229bf43a9
ef43c329ef42a7b".6355
1410 DATA "5c016000cb5f280301800
0092293f4a7c9dd7e00328df4a72005d
d7e01a7c8dd7e01328ef4dd3601ffd9e
5dd6e08dd6609e5".5823
1420 DATA "fde1dd4e06dd4607d9dd7
e0a328bf4dd4e02dd460379e6073c328
cf4dd770acb39cb39cb39dd7106dd700
7dd6e04dd6605dd".6229
1430 DATA "7508dd7409e5dde1af329
ff43e10f53a8ef4a72823d9c5cd90f0f
d4600fd4e10fd233a8bf4cddff11e00c
debf1c1cd0bf2d9".7433
1440 DATA "3a8df4a72818c5cd90f0d
d4600dd4e10dd233a8cf4cddff11e01c
debf1c1cd0bf2f13d20b7d9e1d9fd213
a5c3a9ff41fc916".7123
1450 DATA "003dc8cb38cb19cb1a18f
678cdf8f179cdf8f17acdf8f1c9ae77c
b43c413f27df5e6e06ff13ce61fb56fc
90478fec0d80600".7695
1460 DATA "c9d5e57c0f0f0fe603f65
8677ee1e607fe063f1e00cb133a9ff4b
3329ff4d1c92100fa010003a7ed42eb2
1003dedb0010003".5651
1470 DATA "eb2b7e0fb6770b78b120f
62522365cc916030010061100120013 0
02e2e2e43484f495345533a0d0d20202
020312013011101".2820
1480 DATA "2049462049492026204b4
559424f415244205 15a4f50201100130
00d0d2020202020322013011101204b454
d5053544f4e204a".2515
1490 DATA "4f595354494 34b2020202
020110013000d0d0d2020202020332013 0
1110120535441525420544845204741 4
d4520202020202020".2227
1500 DATA "2020110000d0d0d0d0d100
32e2e2e53504543494 14c20434f4e545
24f4c204b4559533a10060d0d2020202
053504320202020".2333
1510 DATA "2d20454e442047414d450
d2020202043415053534820 2d2050415
55345 0d2020202053594d53482020 2d2
0534f554e44204f".2878
1520 DATA "4e2f4f46462020544150 4
5574f524d2020202020202004040404038
0100413011600017f2031393835204d6
97175656c207661".2707
1530 DATA "6e20536d6f6f72656e627
57267 0d2020202020204d75736963206
2792045727 7696e204d617278a053434
f52453a30303030".4061
1540 DATA "30304c4956 45533a03030
3034849474820 53434f52453a303030 3
030302042793a202d2d2d2d2d2d2d2d5
94f5520484 15645".2845
1550 DATA "20424541544 54e2054484
52048494748534 34f524521594f55522
04e414d453f20202020202020202047204
1204d204520204f".2949
1560 DATA "2056204520522020202 02
0202020d315010aff010101010101010
101010101010101010101010101010 10
101010101010101".1118
1570 DATA "01010101010101010101010
10201030104010501060107010801090
10a010b010c010d010e010f01100111 0
112011301140115".260
1580 DATA "0116011701180119011a0
11b011c011d011e011f01010000373f40
000000005a456060701ff01ffb55728e
a165628ea0700ff".2609
1590 DATA "01dc390187000170fbc4e
c02013e0a0103001161012144f3cd4df
01e063e09cd4df01e473e01cd4df0c9c
da9ef3efecd0116".4943
1600 DATA "1154f201ef00cd3c20c93
e00cd01161158f33e00cd0a0cc93e003
218f4cd79eacdc6f4cdd6f4cda9f4cdf
9ee2a89f43a16f4".6518
1610 DATA "cd56f53eff3218f43e05c
db1ec28f9f3cdd4f0cd10ebfb3efedbf
ee61fc83ef7dbfe2fe60728e8f5cd67e
cfbf1fe0428b521".8133
1620 DATA "a458fe01cc56f5fe0221e
458fe02cc56f53ef7dbfe2fe60728c3f
3cdd4f0cd10ebfb18ede52a89f4cbbee
12289f4cbfe3216".7321
1630 DATA "f4c900000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
000000000000000".445
```

Quickdraw

Geoff Hatto has come up with some further improvements to graphics on the CBM-64.

Commodore Basic is notorious for its shortcomings. Perhaps the most grievous of them is the lack of any graphics commands. In the April issue of last year Geoff Hatto remedied this with a Quickplot routine which supplied an easy-to-use plotting command for the CBM-64's high-resolution screen.

Now he has followed it up with a Quickdraw program. For those who missed Quickplot the first time round, we have reprinted the listings and instructions.

To operate Quickdraw you must first load and initialise Quickplot. If you are starting from scratch, type in and save listings 1, 2 and 3. If you already have Quickplot on tape, just type in listing 3.

When you run listing 1, it loads in the main Quickplot program, listing 2. To initialise the high-res screen enter:

SYS 4096,ink,paper,gclear

where ink and paper are the colour values 0 to 15; a non-zero value for gclear clears the screen, zero leaves it intact. Typing

SYS 4096

without any following parameters, takes the current screen colours and the value of 1 for gclear — as default.

Once Quickplot has been enabled, pressing F7 switches in out of the high-res screen — even if a Basic program is running. The Plot command takes the syntax

SYS 4318,x,y,p

where x and y are the pixel coordinates — 0 to 319 and 0 to 199 — and p is either zero, for unplot, or non-zero for plot.

When you have loaded and run listing 3, call the Draw routine with the command

SYS 4474,x1,y1,x2,y2,p

where x1,y1 and x2,y2 are the start and end points of the line, and p is either zero or non-zero, for plot or unplot.

Quickdraw uses a highly efficient line-drawing algorithm which cuts the "jaggies" down to a minimum. It also lives up to its name by being extremely fast — faster, in fact, than the Spectrum's built-in Draw routine. Try listing 4 for a demonstration of its speed.

The only restriction to the routine is that you cannot have more than two colours on the high-res screen. But as lines 150 to 200 in Listing 4 demonstrate you can change the colours instantly.

Listing 1.

```
10 REM  *************************
20 REM  **    C64 QUICKPLOT    **
30 REM  **    G.HATTO          **
40 REM  *************************
50 :
60 :
70 POKE631,131:POKE198,1
80 POKE64*256,0:POKE44,64:NEW

READY.
```

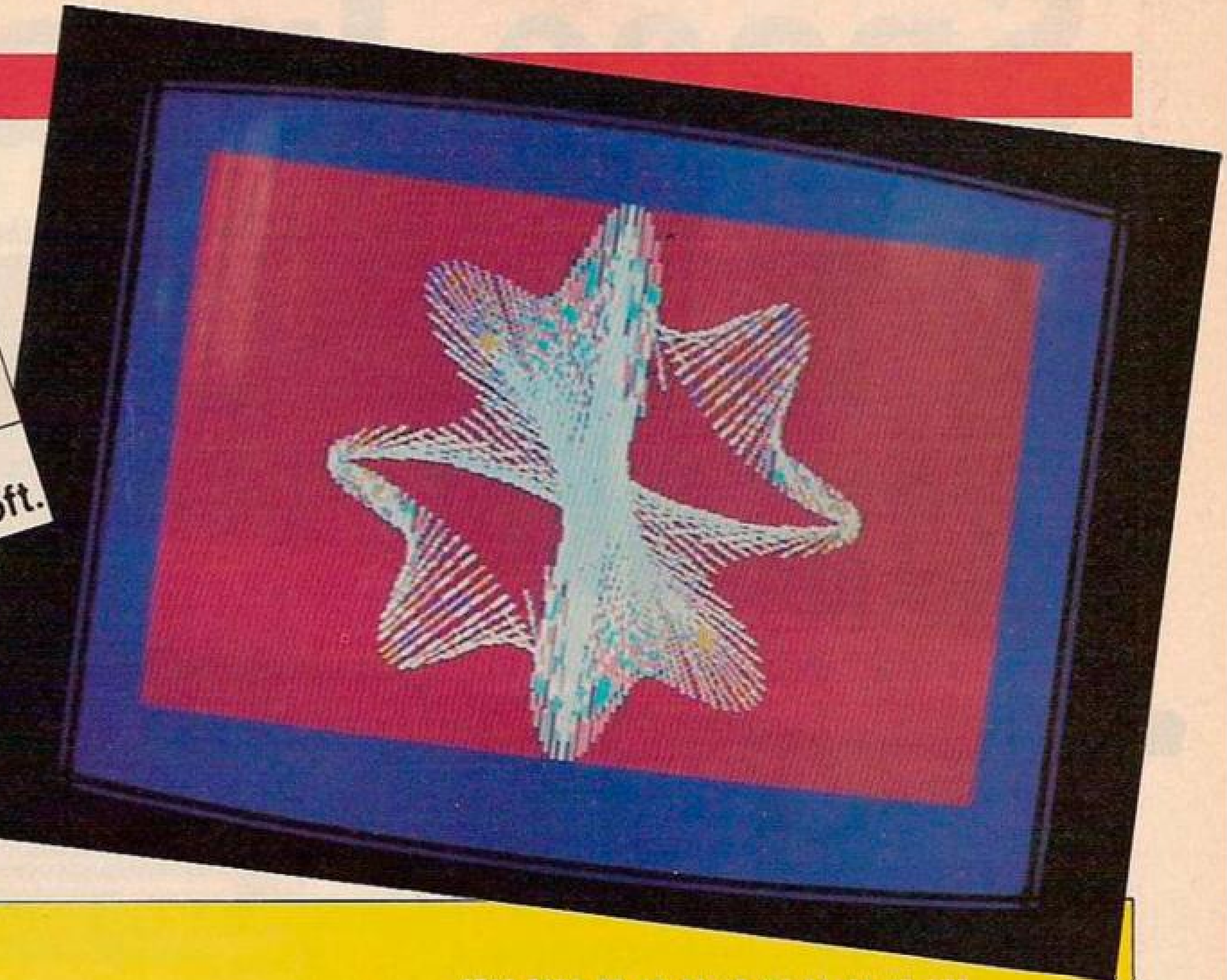
Listing 2.

```
10 REM  **************************
20 REM  **   QUICKPLOT LOADER   **
30 REM  **   G.HATTO            **
40 REM  **************************
50 :
60 :
70 MAXNUMBER = 48
80 DEF FN LINENUMBER(A) = PEEK(63)+PEEK(64)*256
90 :
100 READ ADDRESS
110 FOR COUNT=1 TO MAXNUMBER:GOSUB 230:READ CHECKSUM
120 IF SUM <> CHECKSUM THEN PRINT"CHECKSUM ERROR IN ":
FN LINENUMBER(0):END
130 L = FN LINENUMBER(0):PRINT L
140 IF ADDRESS <> L+8 THEN PRINT"LINE NUMBER":L;" NOT
IN ORDER":END
150 NEXT COUNT
160 :
170 PRINT:PRINT"   HIRES ="
180 PRINT"       SYS4096,[INK],[PAPER],[GCLEAR]"
190 PRINT:PRINT"   PLOT  ="
200 PRINT"       SYS4318,[X],[Y],[PLOT/UNPLOT]"
210 END
220 :
230 SUM = 0
240 FOR I=1 TO 8:READ ENTRY$
250 GOSUB 310
260 POKE ADDRESS,ENTRY
270 ADDRESS = ADDRESS+1:SUM = SUM+ENRTY
280 NEXT I
290 RETURN
300 :
310 IF LEN(ENTRY$) <> 2 THEN 400
320 A$ = RIGHT$(ENTRY$,1):GOSUB 360:ENTRY = V
330 A$ = LEFT$ (ENTRY$,1):GOSUB 360:ENTRY = ENTRY+V*16
340 RETURN
350 :
360 IF A$<"0" OR A$>"F" OR (A$>"9" AND A$<"A") THEN 40
0
370 V = ASC(A$)-48+7*(A$>"9")
380 RETURN
390 :
400 PRINT"DATA ERROR IN ":FN LINENUMBER(0):END
410 :
420 DATA 4096
4096 DATA AD,86,02,85,9B,AD,21,D0,1011
4104 DATA 29,0F,85,9C,20,19,10,20,450
4112 DATA 62,10,20,9D,10,20,8A,10,505
4120 DATA 60,A0,00,A9,2C,D1,7A,D0,1008
4128 DATA 24,20,9B,B7,86,9B,A0,00,855
4136 DATA A9,2C,D1,7A,D0,17,20,9B,962
4144 DATA B7,8A,29,0F,85,9C,A0,00,826
4152 DATA A9,2C,D1,7A,D0,07,20,9B,946
4160 DATA B7,E0,00,F0,03,20,49,10,771
4168 DATA 60,A9,00,A0,20,85,4E,84,800
4176 DATA 4F,A9,00,AA,A8,91,4E,C8,1009
4184 DATA D0,FB,E6,4F,E8,E0,20,D0,1464
4192 DATA F4,60,A5,9B,0A,0A,0A,0A,700
4200 DATA 05,9C,A0,00,99,00,08,99,635
4208 DATA 00,09,99,00,0A,99,00,0B,336
4216 DATA C8,D0,F1,60,A9,14,8D,18,1099
4224 DATA D0,AD,11,D0,29,DF,8D,11,1028
4232 DATA D0,60,AD,18,D0,29,08,09,767
4240 DATA 28,8D,18,D0,AD,11,D0,09,820
4248 DATA 20,8D,11,D0,60,78,A9,D5,996
4256 DATA A0,10,8D,00,03,8C,01,03,464
4264 DATA A9,B4,A0,10,8D,14,03,8C,829
4272 DATA 15,03,58,60,20,BA,10,4C,518
4280 DATA 31,EA,A5,C5,C5,FE,85,FE,1483
4288 DATA F0,0E,C9,03,D0,0A,AD,11,866
4296 DATA D0,29,20,F0,04,20,7C,10,697
4304 DATA 60,20,8A,10,60,8A,30,03,567
4312 DATA 20,7C,10,4C,8B,E3,20,FD,899
4320 DATA AE,20,EB,B7,86,9B,20,F1,1186
4328 DATA B7,86,02,38,A9,C7,E5,9B,1127
4336 DATA B0,05,A2,0E,4C,D5,10,85,795
4344 DATA 9C,4A,4A,4A,A8,A5,15,4A,806
4352 DATA D0,F0,A5,14,90,06,2C,C2,1021
4360 DATA E1,D0,E7,18,29,F8,79,38,1154
4368 DATA 11,85,4E,A5,15,79,51,11,633
4376 DATA 85,4F,A5,9C,29,07,A8,A5,914
4384 DATA 14,29,07,AA,A5,02,F0,08,653
4392 DATA BD,6A,11,11,4E,91,4E,60,726
4400 DATA BD,72,11,31,4E,91,4E,60,766
4408 DATA 00,40,80,C0,00,40,80,C0,768
4416 DATA 00,40,80,C0,00,40,80,C0,768
4424 DATA 00,40,80,C0,00,40,80,C0,768
4432 DATA 00,20,21,22,23,25,26,27,248
4440 DATA 28,2A,2B,2C,2D,2F,30,31,358
4448 DATA 32,34,35,36,37,39,3A,3B,438
4456 DATA 3C,3E,80,40,20,10,08,04,374
4464 DATA 02,01,7F,BF,DF,EF,F7,FB,1281
4472 DATA FD,FE,00,00,00,00,00,00,507

READY.

READY.
```





Listing 3.

```
10 REM  ***************************
20 REM  **   QUICKDRAW LOADER     **
30 REM  **   G.HATTO              **
40 REM  ***************************
50 :
60 :
70 MAXNUMBER = 34
80 DEF FN LINENUMBER(A) = PEEK(63)+PEEK(64)*256
90 ;
100 READ ADDRESS
110 FOR COUNT=1 TO MAXNUMBER:GOSUB 210:READ CHECKSUM
120 IF SUM <> CHECKSUM THEN PRINT"CHECKSUM ERROR IN ";
FN LINENUMBER(0):END
130 L = FN LINENUMBER(0):PRINT L
140 IF ADDRESS <> L+8 THEN PRINT"LINE NUMBER";L;" NOT
IN ORDER":END
150 NEXT COUNT
160 :
170 PRINT:PRINT"   DRAW  ="
180 PRINT"      SYS4474,X1,Y1,X2,Y2,PLOT/UNPLOT"
190 END
200 :
210 SUM = 0
220 FOR I=1 TO 8:READ ENTRY$
230 GOSUB 290
240 POKE ADDRESS,ENTRY
250 ADDRESS = ADDRESS+1:SUM = SUM+ENRTY
260 NEXT I
270 RETURN
280 :
290 IF LEN(ENTRY$) <> 2 THEN 380
300 A$ = RIGHT$(ENTRY$,1):GOSUB 340:ENTRY = V
310 A$ = LEFT$ (ENTRY$,1):GOSUB 340:ENTRY = ENTRY+V*16
320 RETURN
330 :
340 IF A$<"0" OR A$>"F" OR (A$>"9" AND A$<"A") THEN 38
0
350 V = ASC(A$)-48+7*(A$>"9")
360 RETURN
370 :
380 PRINT"DATA ERROR IN ";FN LINENUMBER(0):END
390 :
400 DATA 4472
410 :
4472 DATA FD,FE,20,FD,AE,20,EB,B7,1416
4480 DATA 86,C3,A5,14,A6,15,85,C1,1027
4488 DATA 86,C2,20,FD,AE,20,EB,B7,1237
4496 DATA 86,9B,20,F1,B7,86,02,A9,1050
4504 DATA 00,85,B0,85,B1,85,62,85,983
4512 DATA 64,A9,80,85,61,85,63,38,915
4520 DATA A5,14,E5,C1,AA,A5,15,E5,1192
4528 DATA C2,A8,B0,0E,E6,B0,8A,49,1169
4536 DATA FF,69,01,AA,98,49,FF,69,1116
4544 DATA 00,A8,86,65,84,66,38,A5,858
4552 DATA 9B,E5,C3,B0,06,E6,B1,49,1241
4560 DATA FF,69,01,85,67,A2,FF,E8,1246
4568 DATA 46,66,66,65,66;69,66,6A,790
4576 DATA 46,67,66,6B,66,6C,A5,65,858
4584 DATA 05,67,D0,EB,BD,76,12,85,1009
4592 DATA 6D,BD,7F,12,85,6E,A5,C1,1044
4600 DATA A6,C2,A4,C3,85,14,86,15,1027
4608 DATA 84,9B,20,EB,10,20,1A,12,646
4616 DATA 20,4E,12,A6,6D,D0,02,C6,811
4624 DATA 6E,CA,86,6D,8A,05,6E,D0,1016
4632 DATA E9,60,A5,B0,D0,18,18,A5,1091
4640 DATA 62,65,6A,85,62,A5,61,65,899
4648 DATA 69,85,61,A5,14,69,00,85,758
4656 DATA 14,90,1A,E6,15,60,38,A5,758
4664 DATA 62,E5,6A,85,62,A5,61,E5,1155
4672 DATA 69,85,61,A5,14,E9,00,85,886
4680 DATA 14,B0,02,C6,15,60,A5,B1,855
4688 DATA D0,12,18,A5,64,65,6C,85,857
4696 DATA 64,A5,63,65,6B,85,63,90,948
4704 DATA 14,E6,9B,60,38,A5,64,E5,1051
4712 DATA 6C,85,64,A5,63,E5,6B,85,1074
4720 DATA 63,B0,02,C6,9B,60,03,05,734
4728 DATA 09,11,21,41,81,01,01,00,255
4736 DATA 00,00,00,00,00,00,01,02,3

READY.
```

Listing 4.

```
5 REM ** QUICKDRAW DEMO **
10 SYS 4096,1,2,1
20 PI=3.1412
30 XD=160:YD=100
40 GOSUB 100
50 END
100 FOR N=0 TO 2*PI STEP PI/100
120 S=SIN(N):C=COS(N)
122 S2=SIN(2*N):C2=COS(2*N)
124 X1*XD+C^3*100:Y1=YD+S^3*100
126 R=(C2^3+S2^3)*100
128 X2=XD+R*C:Y2=YD+R*S
130 SYS 4474,X1,Y1,X2,Y2,1
140 NEXT
150 FOR N=1 TO 50
160 C1=INT(RND(0)*15)+1
170 C2=INT(RND(0)*15)+1
175 IF C1=C2 THEN 150
180 SYS 4096,C1,C2,0
190 FOR T=1 TO 2000:NEXT
200 NEXT
210 RETURN

READY.
```

Space Invaders

Jason Charlesworth breathes new life into an old favourite with this Amstrad version.







Listing 1.

```
10 ENV 1.3,5,1,1.Ø.5,5,-1,1,1Ø,-1,2
2Ø ENV 2,5,3,1,3,-2,1,1,Ø,4,9,-1,1
3Ø ENV 3.3.3,1,3,-1,1,2,-1,4
4Ø ENV 4,1,5,1,5,2,3,5,-2,1,1Ø,-1,2
5Ø ENV 5,4,1,1,4,1,2,4,1,3,3,6,1
6Ø DIM n$(8),n(8):FOR a=1 TO 8:READ n$(a),n(a):NEXT
7Ø MEMORY 29999
8Ø PEN 1:MODE Ø:PRINT"   PLEASE WAIT":LOAD "!"
9Ø INK Ø,Ø:INK 1,26:INK 2,2Ø:INK 3,6:INK 4,21:BORDER Ø
1ØØ PEN 1:MODE Ø:PRINT"   SPACE INVADERS":PRINT:PEN 2:
PRINT"  By J.Charlesworth"
11Ø PEN 3:LOCATE 8,8:PRINT"Ø  Abort"
12Ø PEN 4:LOCATE 8,1Ø:PRINT"H  Hold":LOCATE 8,12:PRINT
"S  Restart"
13Ø LOCATE 8,14:PRINT"Z  Left":LOCATE 8,16:PRINT"X  Ri
ght"
14Ø PEN 2:LOCATE 4,18:PRINT"Shift  Fire"
15Ø PEN 1:LOCATE 4,2Ø:PRINT"Or use joystick"
16Ø PEN 4:LOCATE 4,23:PRINT"Press J for Joystick    or
 K for Keys"
17Ø a$=INKEY$:IF a$="j"OR a$="J" THEN POKE 3365Ø,74:PO
KE 33658,75:POKE 32389,76:GOTO 2ØØ
18Ø IF a$="k"OR a$="K" THEN POKE 3365Ø,71:POKE 33658,6
3:POKE 32389,21:GOTO 2ØØ
19Ø GOTO 17Ø
2ØØ CALL 317ØØ:sc=PEEK(33818)+256*PEEK(33819)
21Ø FOR A=Ø TO 5Ø:a$=INKEY$:NEXT
22Ø FOR a=1 TO 8:IF sc>n(a) THEN GOTO 28Ø
23Ø NEXT a
24Ø MODE Ø:PEN 2:PRINT"   Hi Score Table":FOR a=1 TO 8
:LOCATE 2,4+2*a:PEN a+1
25Ø PRINT LEFT$(n$(a),1Ø):LOCATE 13,4+a*2:PRINT n(a):N
EXT a
26Ø FOR a=Ø TO 35ØØ:IF INKEY$="" THEN NEXT a
27Ø GOTO 9Ø
28Ø IF a<>8 THEN FOR b=7 TO a STEP -1:n$(b+1)=n$(b):n(
b+1)=n(b):NEXT b
29Ø n(a)=sc:LOCATE 1,25:PRINT"                    ";:LO
CATE 1,25:INPUT "Name ";n$(a)
3ØØ GOTO 24Ø
31Ø DATA Bilbo,1ØØØØ,Frodo,9ØØØ,Sam,8ØØØ,Gandalf,7ØØØ,
Elrond,6ØØØ,Strider,5ØØØ
32Ø DATA Merry,4ØØØ,Pippin,3ØØØ
```

Listing 2.

```
1Ø MEMORY 29999:MODE 2:INK 1,13:PEN 1:PRINT"Assembly i
n progress,please wait":RESTORE
15 DIM t(55):FOR a=1 TO 54:READ t(a):NEXT
2Ø x=3ØØØØ:FOR a=Ø TO 53:READ a$:t=Ø:IF LEN(a$)<>16Ø T
HEN PRINT"Error in line ";1ØØ+1Ø*a:END
3Ø FOR b=1 TO 159 STEP 2:z=VAL("&"+MID$(a$,b,2)):t=t+z
:POKE x,z:x=x+1:NEXT b:IF t<>t(a+1) THEN PRINT"Error i
n line 8Ø,9Ø or ";1ØØ+1Ø*a:END
4Ø NEXT a:PRINT"Completed,no errors":END
8Ø DATA 9686,68Ø4,5325,6657,5445,719Ø,876Ø,3Ø39,2655,5
248,7781,2523,2344,3236,1996,1899,4154,2894,2423,294,Ø
,7113,8288,7459,8822,872Ø,1Ø378,9819,8199,921Ø,9531,91
46,1Ø799,9853
9Ø DATA 9189,1Ø26Ø,9582,1Ø37Ø,8172,8423,9549,6583,49Ø8
,2656,459,7757,9143,7585,196Ø,128,5883,8668,1,1369
1ØØ DATA ØØØØ5ØFØFØAØØØØØØØØ5ØE4CCCCD8AØØØØØE4CCCCCCCCD
8ØØØØE43CCCCC3CD8ØØØØB47F6C9C7F78ØØØØE43CCCCC3CD8ØØØØE
4CCCCCCCCD8ØØØØE48CCCCC4CD8ØØØØ5ØCCØCØCCCAØØØØØØØE4CCC
CD8ØØØØ
11Ø DATA ØØØØ5ØCCCCAØØØØØØØØØE4D8E4D8ØØØØØØ5ØCCAØ5ØCCA
ØØØØØE4D8ØØØØE4D8ØØØØE4D8ØØØØE4D8ØØØØFØAØØØØØ5ØFØØØØØØ
5ØACFØF458AØØØØØØ5ØØØØØAØØØØØØØØØ44CCCC88ØØØØØØØ449C3C3
C6C88ØØ
12Ø DATA ØØ9C3C3C3C3C6CØØØØ9CØC1C2CØC6CØØØØ9C491C2C866
CØØØØ9CØC1C2CØC6CØØØØ9C3C3C3C3C6CØØØØ9C3CCØCØ3C6CØØØØ4
49C3C3C6C88ØØØØØØ44CCCC88ØØØØØØØØ66A2519ØØØØØØØ1173A25
1B322ØØ
13Ø DATA ØØ1151ØØØØA222ØØØØ33F3ØØØØF333ØØØØØØØØ5ØAØØØØ
ØØØØØØØØØE1D2ØØØØØØØØØ55ØC3C3AØØAØØØØØA5ØC3C3AØØ5ØØØØØ
AE1C3C3D2Ø5ØØØØØAE16B97D2Ø5ØØØØ5AC3C3C3C3A5ØØØØDAC3C3C
3C3E5ØØ
14Ø DATA ØØ8AE1C3C3D245ØØØØ8AE1C3C3D245ØØØØ8A5ØE1D2AØ4
5ØØØØ45ØØ78B4ØØ8AØØØØØØ1428142ØØØØØØØØØ14ØØØØ28ØØØØØØØ
Ø3CØØØØ3CØØØØØØØCØCØØØØØCØCØØØØØØØØFCFCØØØØØØØØØ54FCCØC
ØFCA8ØØ
15Ø DATA ØØE8CØCØCØCØD4ØØØØE9C3C2C1C3D6ØØØØE84FCØCØ4FD
4ØØØØE8CØCØCØCØD4ØØØØ54FCCØCØFCA8ØØØØØØØØFCFCØØØØØØØØØ
Ø1428142ØØØØØØØØ3CØØØØ3CØØØØØØØØ6CØØØØ9CØØØØØØØØCCØØØ
ØCCØØØØ
16Ø DATA ØØF3CCØØØØCC33ØØØØØØ33ØØØØF3ØØØØØØØØ33ØØØØF3Ø
ØØØØ3333ØØØØF3F3ØØØØØCFCFCFCFØØØØØØ45F3E7DBF38AØØØØD
BF7EFDFFBE7ØØØØDBF3EFDFF3E7ØØØØ45F3E7DBF38AØØØØØØFØFØF
ØFØØØØØ
17Ø DATA ØØØ53372B133ØAØØØØ1B377AB53B27ØØØØ1B337AB5332
7ØØØØØ53372B133ØAØØØØØØF5AA5ØFØØØØØØØØØØ5ØAØØØØØØØØØØ
4ØCØCØCØCØ8ØØØØ1C3C3C3C3C2CØØØØ1C3C3C3C3C2CØØØØØ4ØCØCØ
CØCØ8ØØ
18Ø DATA ØØØØØØ4182ØØØØØØØØØØØØØØ4182ØØØØØØØØØØØØØ4182ØØØ
ØØØØØØØØØ4182ØØØØØØØØØØØØØ4182ØØØØØØØØØØØØØØ4Ø8ØØØØØØØ8
8ØØ1C2CØØ44ØØØØ88ØØ1C2CØØ44ØØØØDCØØ1C2CØØECØØØØDCØ43C3
CØ8ECØØ
19Ø DATA ØØ54Ø43C3CØ8A8ØØØØØØBC3C3C7CØØØØØØØØBC2C1C7CØ
ØØØØØØAC4C845CØØØØØØØØA8CØC854ØØØØØØØCØ8448ØØ4ØCØØØØ4
Ø4ØØØØØØØCØØØØØ8Ø8Ø8ØØØØØ4Ø8ØØØ4ØCØCØCØCØCØØØ8Ø8Ø8ØØ
CØØ4Ø8Ø
2ØØ DATA ØØ4Ø4ØØØØCØØCØØØØØØØØØ1Ø3Ø3Ø3Ø2ØØØØØØ46CCCCCC8
9ØØØØØ1CCCCCCCCCØ2ØØØ1CCCCCCCCCØ2ØØ467F7F7F7F89ØØ4
67F7F7F7F89ØØ467F7F7F7F89ØØØ1CCCCCCCCCØ2ØØØ1CCCCC
CCCCCØ2
21Ø DATA ØØØØ46CCCCCC89ØØØØØØØØ1Ø3Ø3Ø3Ø2ØØØØØØØØØØØØØØØØ
ØØØØØØØØØØØØØØØØØØØØØØØØØØØCØCØCØCØCØØØØØ43C3C3C3C3CØØØ
Ø1C3C3C3C3C3CØØØØ1C3C3C3C3C3CØØØ43C383Ø343834ØØØ43C343
C3C3438
22Ø DATA ØØØ43C383Ø3C3Ø3ØØØØ1C3C3C3C343438ØØ1C3C3Ø3Ø3C3
438ØØ1C3C3C3C3C3C3CØØ1C3C3C3C3C2CØCØØ1C3C3C3C3CØ8ØØØØ1
C3C3C3C2CØØØØØØØCØCØCØCØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ
ØØØØØØØ
23Ø DATA ØCØCØCØCØCØØØØØØ3C3C3C3C3CØ8ØØØØ3C3C3C3C3C2CØ
ØØØ3C3C3C3C3C2CØØØØ383Ø343Ø3Ø3CØ8ØØ383C3C343C3CØ8ØØ383
Ø3C3Ø343CØ8ØØ383C3C343C3C2CØØ383C3C3Ø3Ø3C2CØØ3C3C3C3C3
C3C2CØØ
24Ø DATA ØC1C3C3C3C3C2CØØØØØ43C3C3C3C2CØØØØØØ1C3C3C3C2
CØØØØØØØCØCØCØCØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ
ØØØØØØØØØØØØØØØØØØØØØØØØØØ2ØØØØØØØØØØ448Ø8ØØØ8ØØØØØØØCØ884
4CØØØØØ
25Ø DATA ØØØØ44C442ØØØØØØØØØØØØØØ21899 8ØØØØØØØØØC84289 8ØØ
ØØØØØØ4Ø448ØC8ØØØØØØØØØ8ØØØ8ØØØØØØØØØØØØØØØØØØØØØØØØØØØØ
ØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ
ØØØØØØØ
26Ø DATA 4Ø8ØØØØØØCØØØØØØØØ4Ø88ØØ1ØØØØØØØØ8ØØØCCØØØØC4ØØC
4ØØØØØØCØØØ88ØØCCØØØØØØC4ØØ12ØØ8ØØØØØØØØØØØ212ØØ288ØØØØØ
Ø2Ø8ØØ3ØØØØØØØØØØØØØ981ØCC448ØØØC898Ø1441ØCØØØØØC4ØØØ2Ø
3ØØ4Ø8Ø
27Ø DATA 4ØC41Ø4444 1ØØØ8ØØØØØØØØØØ44ØØ88ØØØØØØØØØØØØ4ØØØC8Ø
ØØØØØØØ4Ø8ØØØ4ØØØØØØØØØØ1Ø8ØØØCØ2ØØØØØØØØØØØØØØØØ4Ø8ØØØØØØ
Ø4ØØØ8ØØØØØØØØØØØØØ884444ØØØ2ØØØØ8ØØ1ØØØ2Ø144ØØØØØ64ØØ8ØØ
Ø2ØØØ8Ø
28Ø DATA ØØØ1ØØØØ4ØØØ46ØØØØ8ØØØØØØØØØØØØØØ8Ø44ØØØØØØØØØ4
4ØØØØ88ØØØØØØØØ18ØØØØØ8ØØØØØØØØØØC8ØØ1Ø448Ø88ØØØØ1ØØØØØØØ
```

A long time ago in the good old days when computers were real computers shaped like dog biscuits, and 16K Rampacks were real wobbly 16K Rampacks there existed a game that took the world by storm and choked many an arcade machine on 10p pieces.

It was of course Space Invaders. In it you had to have a really mean and vicious streak, for your task was nothing less than the protection of the Earth and all mankind from nasty (and very thick) aliens. Unlike most recent games this one definitely does not feature thousands of rooms to wander in.

Now this game is available for the Amstrad by just typing in the listings. This version has all the favourite features — marching invaders, defences, mothership and of course your ship to defend earth with. All graphics are large and colourful and in the case of the invaders most are also animated by using the flashing colour facility on the Amstrad.

In the game you must destroy all the alien forces. You do this by shooting them but all the time they get lower and lower and if they get too low you lose a life. They also drop bombs but you can hide behind the defences to get out of their way.

Each bomb that hits the defences chips a little away so any protection is gradually removed.

Every now and then a mothership will cross the screen. If you can shoot it, you get a bonus of 500 points, an alien ship is worth 50.

To set up the game, type in Listing 1 and save it to tape with SAVE "INVADERS". Next type in Listing 2 and run it. Correct any errors found and when it assembles it without errors save the code after Invaders with SAVE "CODE",B,30000,4400

The game may then be played by typing RUN"".

```
00000004480200040004000800000000004400000000042000280400
0424400
290 DATA 000000024400000000040000020800000000000000000
000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000
0000000
300 DATA 000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000
0000000
310 DATA 00000000000000000000000000000000000000003E033
21C84210000221A84CD347DCDD881CD0B7DCD5383CD19BD3AE384C
B4F2003CD917CCDD880CD2F80CD727FCD7B7ECD927DCD5B7D3E2CC
D1EBB28
320 DATA 0DCD4C833E3CCD1EBB28F9CD53833E20CD1EBB2048CD4
07DFE002827FEA030073A9B85FE0028B43A1C843D321C84F5CD4C8
3CDB07C0632CD19BD10FBF1FE00208E181A3A1F843CFE0D20023E0
6321F84
330 DATA CDDD7C0632CD19BD10FBC3DF7BCD4C83C921787CCDAAB
CC90101000F2010F0F0A0021887CCDAABCC90202005E011F0F1E002
19E7CCDAABC21A77CCDAABCC9040300FA000F0F0F0004030084030
F0F0F00
340 DATA CDA7BC1119000608C5ED53DB7CCD19BDCD19BDCD19BD1
B1BD521D47CCDAABCD1C110E5C901040064000000F0B00CDA7BC060
8110100C5ED53097D131313CD19BDCD19BDCD19BDD521027DCDAAB
CD1C110
350 DATA E4C9010500960200F1600DD21E784213075060 5C5060
6C5DD4E00DD4601DD23DD23DD23E5CDE183E1C110EB11800019C11
0E1C901BE00212084 11DE84EDB0C9DD213E85061EDD7E00FEFF200
ADD2BDD
360 DATA 2BDD2B10F197C9DD7E01C93ADE84FEFF200FCDC5837DF
EFFC07CE604FE00C83EFF3C32DE84FE49200F01480021307BCDE18
33EFF32DE84C94F0600213078CDE183C93A1F8447DD214185FD21E
784C5DD
370 DATA 7E04FE00203CFD7E00FEFFCA3E7EE5C5CDC5837DC1E1F
EFADA3E7EFD4E000C0C0C0CFD7E01C60F47DD7100DD7001CD9D83D
D7502DD7403CDC5837DACE6013CDD7704DD4E00DD4601DD6E02DD6
6033600
380 DATA CDB48336000 4DD7E04FE012804CDB48304DD7001DD750
2DD740378FEBE3806DD3604001829E5CDB4837EFE002007360CE13
60C1819E178FEAE38293ADF845F7993FE0830093E01329B85DD360
400DD23
390 DATA DD23DD23DD23DD23FD23FD23FD23C105C29E7DC93EA0B
830E5CD9D8306032BC536002336002336002BCDB4833600CDB4832
BC110EADD36040018C3ED4BE48479FEFF20243E15CD1EBB2005973
2E684C9
400 DATA 3AE684FE00C0CD817C3E0132E6843ADF843C3C3C3C4F0
6B0050505ED43E48478FEC8301FCD9D837EFE00202E36C0CDB4833
6C0CDB4833600CDB4833600CDB4833600C9ED4BE4843EFF32E4840
40404CD
410 DATA 9D833600CDB4833600C93600CDB4833600CDB4833600C
DB4833600CDB4833600ED4BE484DD21E7843E1EF5DD7E00FEFF282
76FDD6601DD7E02FE00201C7995FE0830167894FE103010DD36020
1F13EFF
420 DATA 32E4843E32CD9281C9DD23DD23DD23F13D20C73AE584F
E12D03ADE845F3AE48493FE08D03EFF32E4843EFF32DE8406004B2
1307BCDE1833EFACD92813EFACD9281C93AE084FE00C03AE1843D3
2E18420
430 DATA 133EC032E1843AE28432E084CD947F9732E384C93AE38
4874F878787815F1600212F85A7ED52E5DDE13AE38487878787876
F26002929EB213077A7ED520606C5E5DD4E00DD4601DD5E0279FEF
F28477B
440 DATA FE00201FC5CD9D83E5CDB483D1060897771223131 0FAC
10404DD7001E1E5CDE1831823FE04200CDD3600FF21307BCDE1831
8133CDD77027BA71F672E00CB1511B07919CDE183DD23DD23DD23E
1C1109F
450 DATA 3AE3843C32E384FE05C09732E384C93AE084FE01C03AE
1843D32E18420193AE084EEFE32E2849732E0843E1E32E184CD578
09732E384C93AE3844F3CFE0620019732E38479878121F8845F160
0A7ED52
460 DATA E5DDE10605213075C5E5DD4EFEDD46FFDD5E0079FEFF2
83D7BFE00200B0CDD71FEE1E5CDE183182D7BFE01200321B079FE0
2200321307AFE03200321B07A3CFE05200C21307BDD36FEFFCDE18
31806DD
470 DATA 7700CDE183DDE5E111120019E5DDE1E1118000019C110A
1C93AE084FEFFC03AE1843D32E18420193AE084EEFE32E2849732E
0843E1E32E184CD008197 32E384C93AE3844F3CFE0620019732E38
4798781
480 DATA 21E7845F160019E5DDE10605213075C5E5DD4E00DD460
1DD5E0279FEFF283D7BFE00200B0DDD7100E1E5CDE183182D7BFE0
1200321B079FE02200321307AFE03200321B07A3CFE05200CDD360
0FF2130
490 DATA 7BCDE1831806DD7702CDE183DDE5E111120019E5DDE1E
1118000019C110A1C93A1C84470E19C53E08CD6F82C10C0C0C10F4C
92A1A84C55F160019221A841110270E3ACDC28111E803CDC281116
400CDC2
500 DATA 81110A00CDC28111010 0CDC281C1CD717CC9C53EFF3CA
7ED5230FA19C609E5CD6F82E1C10C0C0CC997CD0EBC213782061 80
E04E5C57ECD6F82C10C0C0CE12310F2214F829746234E23E5F5CD3
2BCF1E1
510 DATA 3CFE1020F0010000CD38BCCD7F8197CD92810110A021B
078CDE1830116A0213079CDE183013 0A021B078CDE183013 8A0213
079CDE183C90703020601050707070707070500090401070909090
9090700
520 DATA 0018181414060 61A1A151502020808 0F0F0707150000 1
50600000061A00001A8787875F160021B48219E506C1CD9D8323DDE
10607DD7E000E02F5E603FE031E0020021ECCFE0220021E88FE012
0021E44
530 DATA 73F1E60C1F1F2B0D20DFDD232323CDB48310D1C906090
808080906000F08080E08080F000E04040404040E00080808 08080
80F000E09090E0A0909000609080601090600090909090906060 00
0000000
540 DATA 00000000040404040E0A0A0006090909090906000C040
40404040E000609010204080F000609010201090600 0A0A0A0F020
202000F080E01010906000304080E0909 06000F09010204040 4000
6090906
550 DATA 0909060006090907010 20C0021618 3CDDDBCC92161831
16B8306810EFFCDD7BCC9FEB100B200816B83FF00CD6F83C91E003
E47CD1EBB28011D3E3FCD1EBB28011C3ADF8483FE4920023E48FEF
F200197
560 DATA 32DF844F06B021B077CDE183C978E6F86F260029545D2
9291978E60717171 7F6C04709C97CE638FE3820051150C819C97CC
60867C9CD0DBD7DAA577CAB5F2ADF832929292919ED5BDF831922D
F83C9C4
570 DATA C7E578E6F86F260029545D29291978E607171717F6C04
709D10610C5EBD5010800EDB0D1EB7CE638FE38200601 50C809180
47CC60867C110E2C9F023000000009FF240160FF00FF00001000001
8000020
580 DATA 00002800000300000380000101200181200201200 28120
030120038120010240018240020240028240030240038240010360
018360020360028360030360038360010480018480020480028480
0304800
590 DATA 384800000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000
0000000
600 DATA 0000000000000000000000000000FF3B011701013FAD0
1FF3C04FF3004FF48043448003C48004548 00FF1E04FF4204FF420
4345A00FF2A04FF5A04FF6004FF3004FF6C04FF48043B6C02FF3C0
4FF7204
610 DATA FF3604FF6604FF5A04FF5A04FF7E04FF5404FF5404FF7
404FF6004FF6004FF600413BE43F7000EBE3EF70015A155CE002CB
F5CFF0024BE54F70041B721FF0021BF51FF0014BF44FF001DA35DD
E000000
620 DATA 000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000100000000000
000000000000000000000000000000000000000000000000000000
0000000
630 DATA 000000000000000000000000000000000000000000000
000000000000000000000000000000000000000FF32FFAAFF043B6
8011C24002424002C2400000000000000000000000000000000000
0000000
```

Beyond

John Dawson offers an introduction to the more practical applications of micros for when the novelty of game-playing wears off.

You bought a computer just before Christmas. Perhaps it had some programs included in the price and you loaded those successfully and played some good games. About now, you might well be asking whether your machine can do anything else. Not because the games are boring, just that you've heard about computers running the air defences of North America, handling the banking transactions of Europe and controlling industrial robots that are building the wealth of Japan.

Your computer can do lots of things and this article looks at some of the ideas and applications, equipment and programs that you can get involved in, add on or build to extend your fun and enjoyment.

First of all, the very complicated integrated circuits in your computer add up to a machine that is good at doing simple repetitive tasks. Look at this tiny Basic program:

```
10 REMark — a very helpful
   program
20 VDU 2: REMark — this
   turns on a printer in BBC
   BASIC
30 FOR line = 0 TO 12
40 FOR column = 0 TO 12
50 PRINT ". ";
60 NEXT column
70 PRINT: PRINT
80 NEXT line
90 END
```

It does something that I find useful because the job is tedious if I have to have to go on doing it for myself. More than that, the machine does it better than I can and it does it over and over again without complaint. The program prints 12 lines of dots, 12 dots wide in the right format for my children to play Boxes.

Bad judgement

On the other hand the computer is very bad at tasks that require free-ranging thought, the initiation of new ideas, balancing emotions and rational thought to make judgements, appreciation of something that is "artistic" and all the other things that characterise us as humans.

In other words, a computer is good at the administration of an established process and bad at deciding how a process can be set up to fulfil a particular need.

Most people don't actually *need* a computer. On the other hand many people have found jobs that they want to do for which a computer is a valuable tool. If you really want to use the computer to help you with some part of your life, you can do this successfully only if the machine fits in to your way of doing things and not if you are the component of the system that has to be changed.

You must identify the things that you want to do anyway that the machine can do more easily, more accurately, more profitably, with less tedium, and so on. The point of using the machine is to make life better and more enjoyable for you, not the other way round.

For example, you may find that there is real value in a program that will help to keep track of your stamp collection by preparing an indexed list of the various stamps, the date you bought them, the price you paid, the current price and other data relating to what may be either a hobby or a business.

If you are a photographer and you are making up a number of batches of chemicals for processing films or prints, it may be helpful for you to use a program that will remind you of the name and order in which chemicals have to be added to each solution and the weight of each of the components to be added.

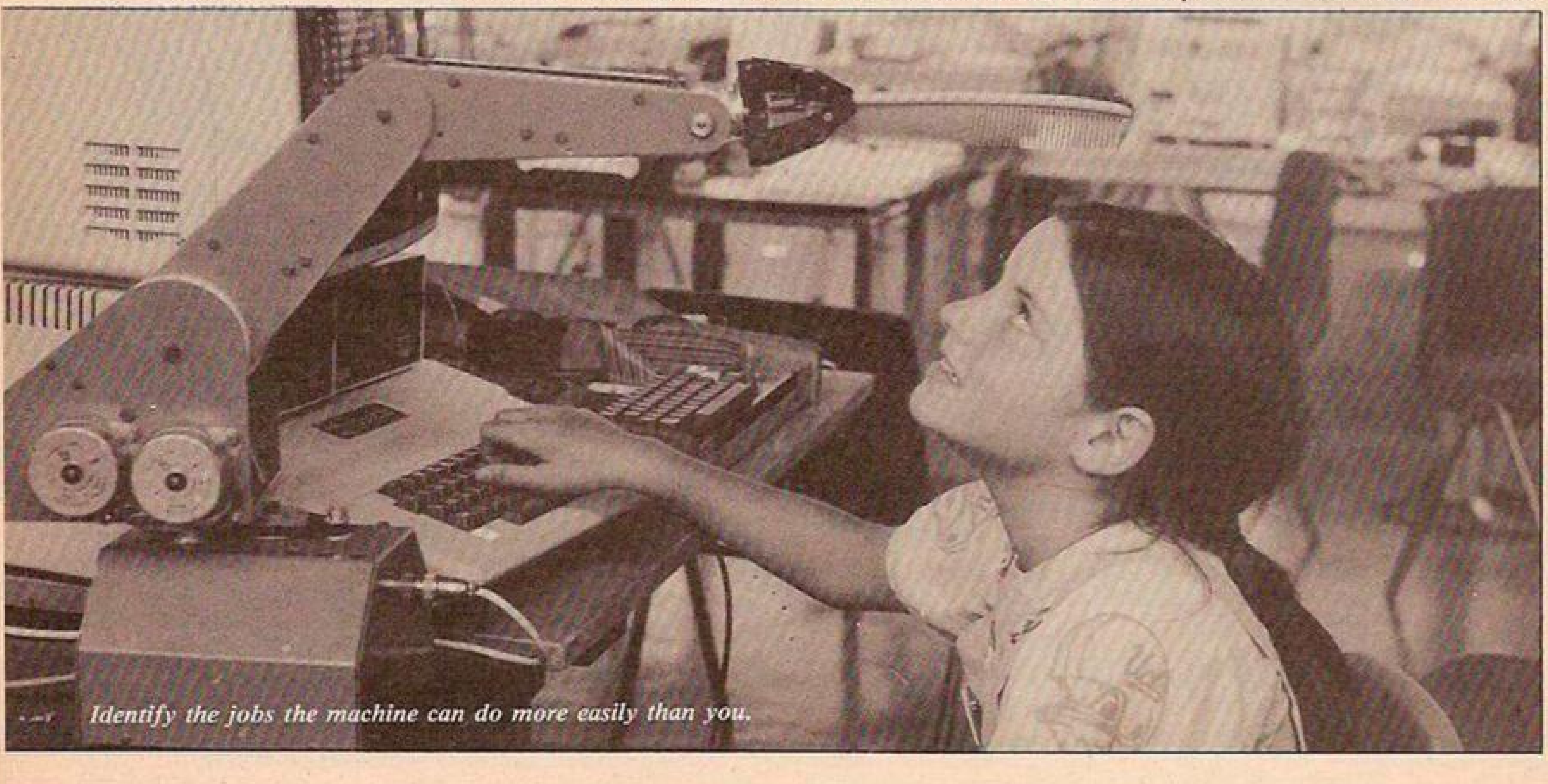
You might also add a special input device that will measure automatically the weight of each substance and then print a label for the container at the end of the process. Using the built-in clock in many microcomputers, you could use almost the same program for beer or wine making, employing the machine to time the various stages as you go along.

Practical value

The only consideration that will determine whether or not your application is successful is the practical value you get out of it. Far too many commercial programs expect people to fit into a straitjacket in order to comply with the program's requirements. Silly things like insisting that you fill in the number of copies you need when a document is printed when we know that on the vast majority of occasions the answer will be "one". Little irritations like this simply reduce the usefulness of a program.

Big design faults like collecting information that you will never use, or changing your routines by forcing you to get up 20 minutes early in the morning to record the temperature in the central heating system will lead to the machine being used as an expensive door stop.

If you buy a program to add up the amounts on your cheque book stubs you will soon run out of enthusiasm because the bank will generally do the job



Identify the jobs the machine can do more easily than you.

Games

much better on your statement sheets. A pencil, paper and a pocket calculator are better tools in any case if you decide you must check some simple figures for yourself.

A home budget program can make a real contribution by allowing you to assign items from a bank statement or your cheque book into categories of expenditure. You can then analyse the change in each category from the last time you ran the program and plan how best to manage your money for the next accounting period. In other words, the machine is helping you to do a job which would otherwise be so tedious that you might not do it at all, and it is helping you to do it more accurately.

Microcomputers are being used for the control of many small pieces of machinery. Amateur astronomers have used a BBC computer to control the elevation and rotation of telescopes, many laboratories have used the BBC and other computers such as the Sinclair Spectrum to run experiments and control plotters, spectroscopes and other equipment. You can run the automatic watering system in a greenhouse with very little difficulty. Robot arms are another popular area for microcomputer control.

Into the loop

In all of these applications the most important concept is the closed loop. Probably the simplest closed loop is an ordinary electric heater plugged into a thermostat. You set the temperature you want the system to achieve by turning the knob on the thermostat. This is the equivalent of programming a control process on a computer.

For example, you might instruct the computer to rotate a telescope at a rate that is just sufficient to compensate for the Earth's rotation while a long photographic exposure is made of a particular star cluster.

If the temperature in the room is too low, the switch in the thermostat closes and the heater is switched on which increases the temperature of the air in the room. When the temperature rises above the "programmed" temperature the switch opens and the heater is switched off.

Provided that the temperature outside the room is lower than it is inside, heat will be lost to the surrounding environment, and when the temperature inside the room drops below the programmed setting, the heater will be switched on again.

The thermostat, the heater, the air inside the room, and the surrounding air combine to make a "closed loop" system. The purpose of the closed loop is to maintain the temperature inside the room but this can go wrong if one part of the system is faulty. Suppose that the outside temperature is higher than the interior temperature. The system has no way of cooling the air inside and the system may fail. If the heater is not powerful enough to replace the heat lost to the environment, the temperature inside may never reach the point at which the thermostat will switch off.

Gaining experience

However, in terms of using your computer, it's possible to have a vast amount of fun and to get a lot of experience without having to worry too much about the error/fool-proofing that's necessary for a commercial process. One thing you will discover quite early on when you start to write programs is that the core of the program, the part that actually carries out the process, often forms only a small part of the total set of instructions. The rest of the program is concerned with:

1. Presenting information on the screen in ways that are intelligible to the user.
2. Taking information into the program while checking to ensure that false, and possibly dangerous, values are eliminated.
3. Handling errors that may occur in the processing — division by zero is a classic problem — or in the program itself.

The program below is

(continued on next page)

FIGURE 1

```
Number guessing game for the BBC and other microcomputers
    10 REMARK - a very simple game
    20
    30 REPEAT
    40   CLS
    50   PRINT: PRINT: PRINT
    60   PRINT "Try to beat the computer"
    70   PRINT
    80   PRINT "I know a number between 1 and 100"
    90   PRINT
   100   PRINT "Can you guess it?  PRESS Y or N    ";
   110   A$ = GET$
   120   IF A$ = "Y" THEN GOSUB 170
   130   IF A$ = "N" THEN CLS: PRINT "Bye, bye ": END
   140   UNTIL A$ = "Q"
   150 END
   160
   170 REMARK - number guessing subroutine
   180 CLS
   190 C=0: N=-999
   200 R=RND(100)
   210 REPEAT
   220   PRINT: PRINT: PRINT
   230   IF N=-999 THEN GOTO 300
   240   PRINT "Your last try was "; N
   250   PRINT
   260   IF N <> INT(N) THEN PRINT "Whole numbers only
 please ": GOTO 300
   270   IF N < 1 OR N > 100 THEN PRINT "Enter a number
 between 1 and 100": GOTO 300
   280   IF N < R THEN PRINT "Too SMALL"
   290   IF N > R THEN PRINT "Too LARGE"
   300   C=C + 1
   310   PRINT
   320   PRINT "Guess number "; C; "  ...  ";
   330   INPUT "" N
   340   CLS
   350   UNTIL N = R
   360 PRINT "WELL DONE  You took "; C; " attempts "
   370 FOR DELAY = 0 TO 3000: NEXT DELAY
   380 RETURN
```

Beyond Games

(continued from previous page)

another very simple game. The BBC computer selects a number between 1 and 100. The number is a random number and the object of the game is to guess the number with the least tries. When the player enters a guess the program prints out a message saying "too high", "too low", or "well done, you took X attempts". This game is good fun for a short time but requires far more in the way of graphics and sound effects to exploit the idea fully.

Never be ashamed of writing a program in Basic. As you continue to read computer magazines, if you haven't heard already, you'll see criticism of Basic as being an inadequate language, slow, poorly structured and designed only for teaching people how to program. Pascal, Comal, Micro-Cobol, these are languages for real men, they say. Well, actually that's rubbish.

Computer languages are designed to do certain jobs better than others and there is no supreme general-purpose language. Basic comes closer to this definition than most others.

Forth, for example, is very good for controlling machinery, Fortran has many excellent scientific and statistical subroutines written to make certain tasks much easier, historical influences have made Cobol the standard commercial programming language, Pascal is well structured and widely taught in universities, BCPL and C are widely used for writing utility programs such as word processors and other languages — the BBC Basic interpreter was writte in C.

An enormous number of commercially successful, sophisticated programs have been written in Basic and provided that you try to apply good programming habits there is no reason why you cannot use the Basic interpreter supplied with your machine to make it run many of the applications you may wish to develop.

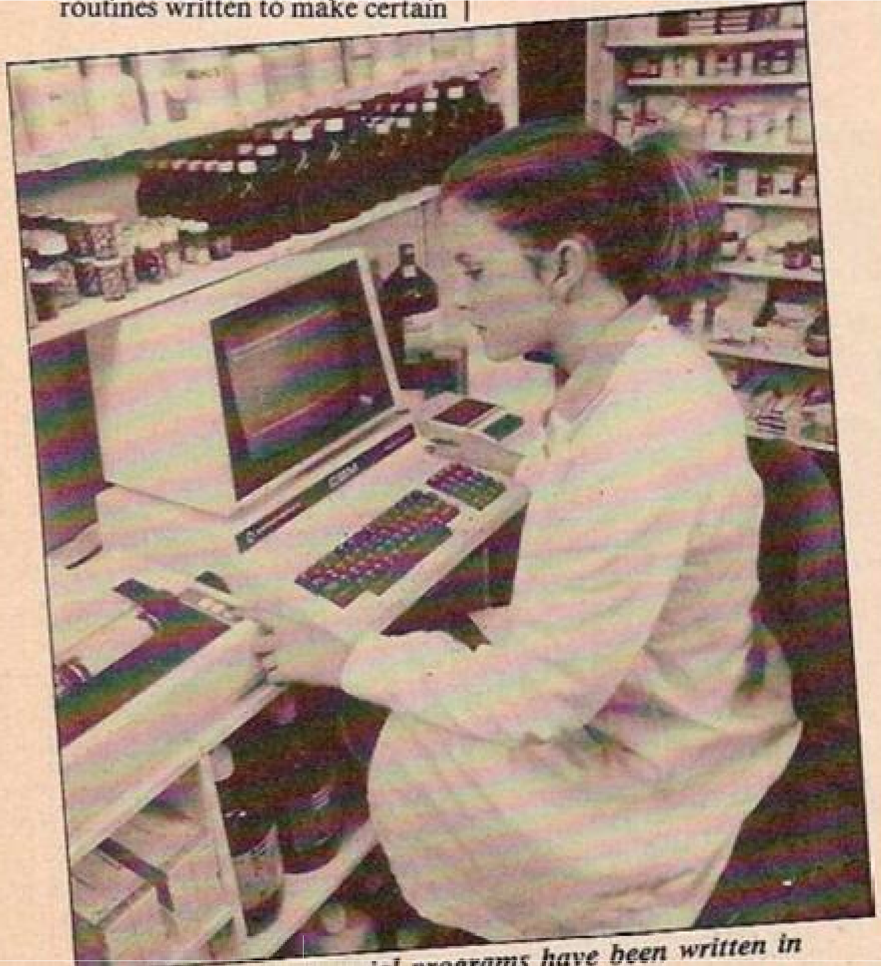
What is important is knowing what a language will do and what areas are best avoided.

In control

Many programs are written to control one or other of the range of peripheral equipment that is available for most microcomputers. The most common piece of add-on equipment to the domestic microcomputer must be a printer but there are many others that will switch 250V AC appliances on and off, communicate with remote computers (modems), draw graphs and pictures, or measure radio propagation paths, for example.



A computer club can help build up your knowledge.



Many, many commercial programs have been written in Basic.

Various predictions suggest that printer prices are due to fall very sharply in the early part of 1986. A printer can be used for more than word processing and printing out or dumping the contents of the screen.

Most dot-matrix printers offer a condensed print mode which will print about 132 characters across the paper. That means that you can achieve a resolution of about 1 per cent (1 part in 100) for printing a graph simply by using the position of a condensed full stop as a point on a graph.

If you can vary the amount of paper that the printer moves when it carries out a line feed you may be able to make the dots touch so that a smooth line of good resolution can be obtained. Some people have mounted photocells on the printer head and scanned a photograph to input information about brightness levels into the computer rather than using the printer to output data.

Joysticks are used most often for playing games. However, they can be used also by people who are disabled for controlling ordinary programs such as a word processor. Many, but not all, joysticks contain two potentiometers or variable resistances which provide an analogue signal for the computer. If your machine will work with this type it is a simple matter to connect other variable resistances to the same port to measure other signals.

So, if your machine has an analogue to digital converter port (ADC or A-D converter) you can measure small electrical voltages directly and this can be used, for example, to determine when the level of liquid in a container has reached a predetermined height.

One fascinating aspect of the use of computers is the communication of skills and knowledge. I have touched on this already in this article when I said that a program could be written to help a photographer mix a particular photographic solution correctly.

The point of the program is not only to help the original user to achieve the right solution at the right temperature, but to communicate the skill so that anybody who loaded and ran the program could achieve the same results.

Store of knowledge

You may have noticed that you can acquire a lot of knowledge and expertise about a subject that is lost if you don't put into practice for sometime what you have learned. You may have puzzled out the wiring diagram for an electromechanical timer on a washing machine and the traced through the various possibilities until you discovered the fault. Try to repeat the exercise in a year's time and you will have to start all over again. The computer can be used to store the results of all your labour.

There's no end to the use to which you can turn a microcomputer because it is the first general-purpose programmable tool we have possessed. More often than not the limitation on its use is in your mind. Don't try to force your own way of working to fit in with what the machine can do unless you can see a real gain. ●

Multi-tasking

Here's how to have a dozen pairs of hands. Jeremy Hill presents the art of multi-tasking for the delectation of BBC users.

Multi-tasking is the running of several programs at the same time on the same computer. This program allows multi-tasking on the standard BBC computer in Basic, but will probably not work with the second-processor.

Actually on most computers, certainly on microcomputers, true multi-tasking — programs really running at the same time — is impossible.

The method we use to get around this is to run each program for a short period of time — this is called a time-splice — and then go on to the next program until the last program is reached, then the first program is continued from when it left off, and so on.

To give the impression of all the programs running at the same time, the time each program is run for before it goes on to the next is usually quite short.

Because BBC Basic was not designed for multi-tasking there are certain restrictions imposed on the programmer. For instance this program cannot be switched within procedures without causing some rather undesirable consequences. Also you cannot switch tasks within Gosubs, For . . . Next and Repeat . . . Until loops.

To use this system is very simple, you simply type the listing — ignoring comments in the form Rem . . ., or : . . . if you wish to — and save it. When you wish to use it within a set of programs to run together you load in this program and type in before it the set of programs together with a 'description line' before the actual program — see later. Note that Break must be pressed before Procassem is used again.

Another restriction of this system is that all the programs have to be written one after each other, in the same program area, although this means that you can use "global variables" in order to allow all the programs to communicate with each other. You must note, however, that all the variables are global and using the same variable in more than one program unintentionally will cause dire consequences. You have been warned! An example of how to use this system:

```
10 PROCassem
20 !&72=&FFFFFFFF (time
   splice in hundredths of a
   second)
30 ?&76=&FF
40 GOTO 70 (first program
   line number)
50
60 REM Program 1
70 CALLdefine:GOTO 120
   (next program line number)
80 REM Any program
90 CALLchk:GOTO 80
100
110 REM Program 2
120 CALLdefine:CALLstart (to
    signal last program)
130 REM Another program
140 CALLchk:GOTO 130
```

Lines 20 to 40, 70, 120 are description lines. These setup the tasks by telling the system where the tasks are within the program.

When an individual task is being performed the system has to be told when it can change the task being run. This is done by putting: Callchk at points in the tasks where switching can take place, eg FNs or Procedures. If the time-splice is over the program will be suspended until its time-splice comes around again otherwise the execution will continue after the Call.

It is important to remember that the task being run will not change until the time-splice is over and Callchk has been executed, so the program can use extra time if it needs to by not calling chk. If, on the other hand, the task being executed needs no more time for the moment it can force a switch by executing:

```
CALLnxt
```

This program works by making use of the interval timer built into the BBC.

This timer counts from the number you specify to 10991162703 by one every hundredth of a second. When the counter reaches its maximum number it resets back to zero (giving you a range of a hundredth of a second to nearly three and a half centuries long time-splice!). When this happens the computer is informed of 'Interval timer crossing zero'.

This is when my multi-tasking routine comes in. When the computer detects this condition my routine takes over and sets a signal in the computer — a flag — to show that the time-splice is over.

When your program executes Callchk another routine in my program checks this flag to see whether the time-splice is over. If the time-splice is not yet over then the task continues as normal. Otherwise it stores where the program left off and restores the next program's position. This is unless it has reached the last program, in which case it resets to the first program again.

Finally bytes &4F to &80 in zero-page are used by this program, and when you run the program after you have typed it it (save it first!) you should then see a demonstration of multi-tasking. If you see this you can then adapt the program for your own multi-tasking application.

The program listed below is an example of the multi-tasking on the BBC with five programs running at the same time. These are:

i) A program printing text in the top, left hand corner of the screen;

ii) A program plotting individual random points on one area of the screen;

Multi-tasking demo.

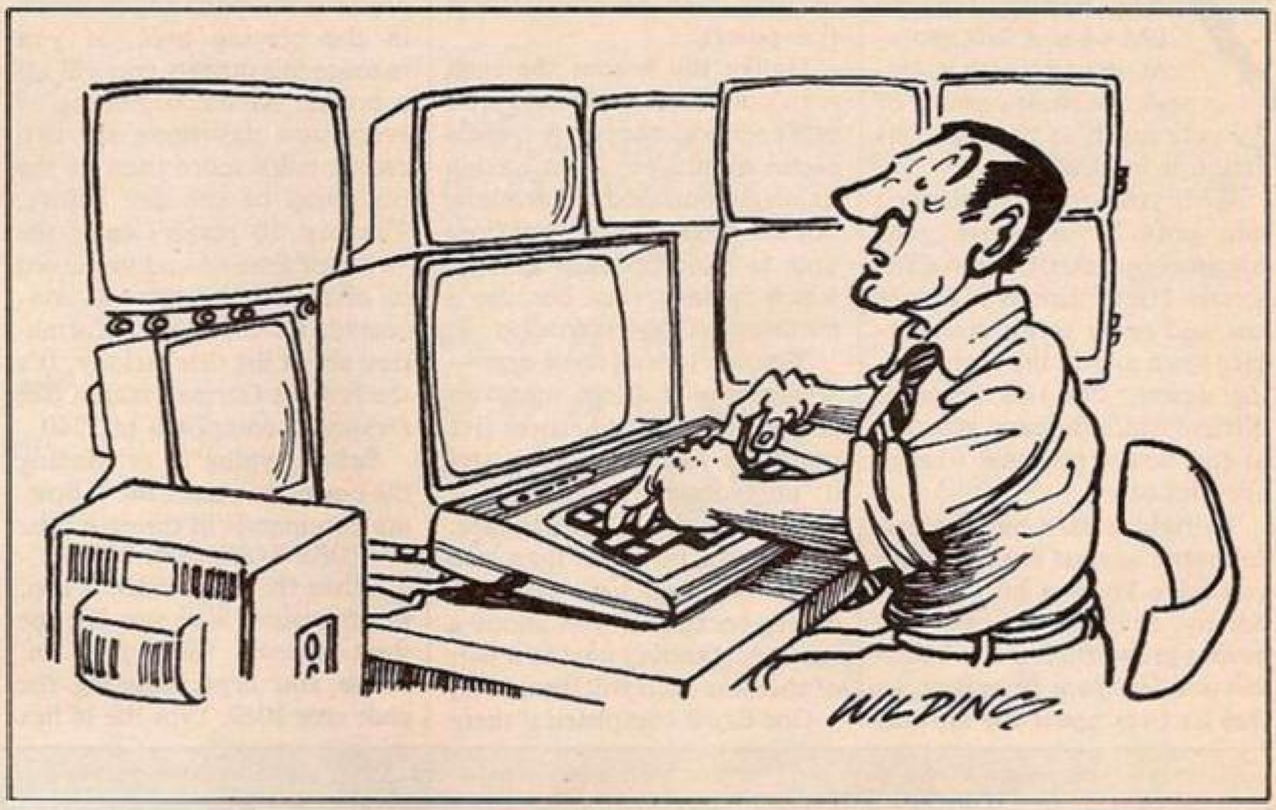
```
   10 MODE0
   20a$="Hello everybody this a demonstration of
 my multitasking program.  At the moment there a
re five programs running at the same time. "
   30DIM st1% 256
   40REM A multitasking program example
   50PROCassem:!&82=&FFFFFFFE:?&86=&FF
   60
   70REM Program one - print instructions
   80CALLdefine:GOTO 170
   90a%=1
  100PRINT TAB(0,0);MID$(a$,a%,30)
  110a%=a%+1
  120IF a%+10<LEN(a$) CALLchk:GOTO 100
  130PRINT TAB(0,0);"
    "
  140GOTO 90
  150
  160REM Program two - draw random graphics
  170CALLdefine:GOTO 230
  180PLOT 69,RND(400)+200,RND(400)+200
  190DRAW RND(400)+200,RND(400)+200
  200CALLchk:GOTO 180
  210
  220REM Program three - draw more graphics
  230CALLdefine:GOTO 280
  240PLOT 69,RND(400)+400,RND(400)+400
  250CALLchk:GOTO 240
  260
  270REM Program four - check keyboard and enter
 command
  280CALLdefine:GOTO 380
  290p%=st1%:l%=0
  300IF ADVAL(255)<1 CALLnxt:GOTO 300
  310k%=GET:PRINT TAB(l%,5);CHR$(k%);:IF k%=127
p%=p%-1:ELSE IF k%>31 ?p%=k%:p%=p%+1
  320l%=POS
  330IF k%<>13 CALLnxt:GOTO 300
  340?p%=13:($st1%)
  350GOTO 290
  360
  370REM Program five - time
  380PRINT "Time:"'
  390INPUT "Hours ?"h%:IF h%>23 GOTO 390
  400INPUT "Minutes ?"m%:IF m%>59 GOTO 400
```

iii) Another program drawing lines in random positions in another area of the screen;

iv) Yet another program checking the keyboard and accepting Mos commands ('*' commands), executing the line when Return is pressed. The line will be printed just below the text and Delete will work as usual;

v) Lastly there is a program telling the time (not very accurately, but it serves as a demonstration) in hours and minutes at the top of the screen in the middle of the line.

The last part of the program is simply the m/c assembly of the multi-tasking code. This program creates quite an interesting visual effect, and is worth referring to in order to see how the multi-tasking utility is used.




```
410z%=0
420CLS
430CALLdefine:CALLstart
440
450PRINT TAB(40,0)h%;" ";m%
460z%=z%+1:IF z%<480 CALLnxt:GOTO 450:ELSE z%=
0
470
480s%=0:m%=m%+1:IF m%<59 CALLnxt:GOTO 450
490m%=0:h%=h%+1:IF h%<23 CALLnxt:GOTO 450
500h%=0:CALL nxt:GOTO 450
510
520DEFPROCassem
530flg=&87:n_evnt=&88
540DIM mc 200
550FOR a%=0 TO 2 STEP 2
560 P%=mc
570 [opt a%
580  .setup lda #13
590  ldx #5
600  jsr &FFF4
610  lda #0
620  sta &80
630  rts
640
650.define ldx &80
660  cpx #&31
670  bcs noroom
680  ldy &0A
690.nxtchk lda (&0B),Y
700  iny
710  cmp #13
720  bne nxtchk
730  dey
740  tya
750  clc
760  adc &0B
770  sta &4F,X
780  inx
790  lda &0C
800  adc #0
810  sta &4F,X
820  inx
830  stx &80
840  rts
850.noroom brk
860  EQUS "Too many programs"
870 BRK
880
890.start lda #14
900  ldx #5
910  jsr &FFF4
920  jmp first
930
940.nxt lda #0
950  sta flg
960  ldx &81
970  dec &0A
980  lda &0B
990  clc
1000  adc &0A
1010  sta &4F,X
1020  inx
1030  lda &0C
1040  adc #0
1050  sta &4F,X
1060  inx
1070  cpx &80
1080  bcc nreset
1090.first ldx #0
1100.nreset lda &4F,X
1110  sta &0B
1120  lda &50,X
1130  sta &0C
1140  stx &81
1150  lda #0
1160  sta &0A
1170  lda #4
1180  ldx #&82
1190  ldy #0
1200  jmp &FFF1
1210
1220.chk lda flg
1230  bne nxt
1240  rts
1250
1260.event php
1270  cmp #5
1280  bne n_int
1290  sta flg
1300.n_int plp
1310  jmp (n_evnt)
1320 ]
1330NEXT
1340
1350 ?n_evnt=?&220
1360 ?(n_evnt+1)=?&221
1370 ?&220=event MOD 256
1380 ?&221=event DIV 256
1390 CALLsetup
1400ENDPROC
>
```

Desert

Burkhard Meier goes through the desert on a CBM-64.

Desert Decision for the CBM-64 is a fast shoot-'em-up game with a strategic touch. It consists of 7K pure machine code, so fast action is ensured.

With your joystick plugged into port 2 you move your trigger-happy sheriff around the screen. His mission is to ensure law and order in his monster-safe town and in the surrounding desert. But this becomes difficult since the cacti growing in the desert produce strange alien monsters.

To fight a hard but successful battle against the monsters you have know a bit of basic botany. In the desert cacti and bushes grow. Bushes are harmless and fear your firepower, so they try to escape if you are able to shoot them. One bush scores five points.

Unlike the bushes the cacti aren't able to move and you can't shoot them. A single cactus without any other cacti in its neighbourhood is harmless, but two neighbouring cacti from time to time produce an egg, which is dangerous because a monster will hatch from it.

You can't shoot these eggs — you can only shoot monsters and each one killed scores five points. If you shoot a monster it immediately turns into a cactus. But this is your chance: there can't be more than two cacti standing next to each other, because if you shoot a monster standing next to a pair of cacti the cacti will disappear.

One day is completed if there are no cactus pairs and monsters in the playing area. If you manage this quickly you will get a bonus. At the beginning of every new day there are two cactus pairs more than at the beginning of the day before. The best 10 players enter the "Hall of Fame" and are saved to disc if a disc drive is connected. Finally some information about the title melody. It's the famous German march *Der Dessauer*, composed in 1740.

Before typing in or loading the hexloader, enter the following commands in direct mode:

POKE 642,60:SYS 64760

When the hex loader is run, the computer asks you for the start address for typing in. When you begin entering the code type 2049. Type the 16 hex digits followed by Return. Then enter the checksum, also followed by Return. If the program detects an error in the line just entered, you have to enter this line again. Repeat this procedure until the whole code is entered.

If you want to save the code earlier, you must type "*" instead of the hex digits. Don't forget to load the uncompleted file before you load the hexloader and continue typing in.

If you want to avoid those endless hex digits, copies can be ordered from me, Burkhard Meier, at Schinkelstr. 26, D-3340 Wolfenbüttel, West Germany. Please state whether you want the program on tape or on disc and enclose £2.50 with your letter.

Listing 1.

```
0 REM ********************************
1 REM *                              *
2 REM *       HEXLOADER FOR          *
3 REM *     "DESERT DECISION"        *
4 REM *                              *
5 REM ********************************
6 :
10 IFPEEK(44)=60THEN100
20 PRINT"{CLR}PLEASE TYPE THE FOLLOWING COM
MAND"
30 PRINT"BEFORE LOADING THE HEXLOADER:"
40 PRINT"{DOWN}{RVS}POKE 642,60:SYS 64760"
50 END
100 INPUT"{CLR}START ADDRESS ";SA:PRINT
1000 FORA=SATO9173STEP8
1010 PRINTA;:INPUTH$:IFH$="*"THEN1090
1015 PRINT"{UP}"TAB(25)::INPUT"CHECKSUM";CK
1020 C=0:FORB=0TO7
1030 HX$=MID$(H$,B*2+1,2)
1040 H=ASC(LEFT$(HX$,1))+(ASC(LEFT$(HX$,1))
>57)*7-48
1050 L=ASC(RIGHT$(HX$,1))+(ASC(RIGHT$(HX$,1
))>57)*7-48
1060 BY=L+16*H:C=C+BY:POKEA+B,BY:NEXT
1070 IFC<>CKTHENPRINT" ERROR - PLEASE INPUT
 AGAIN":GOTO1010
1080 NEXT
1090 INPUT"{DOWN}{DOWN}{DOWN}FILE NAME ";P$
1100 INPUT"{DOWN}DEVICE NUMBER (1=TAPE,8=DI
SK) ";DV
1105 C=PEEK(646)
1110 POKE646,PEEK(53281):PRINT"{CLR}POKE43,
1:POKE44,8:POKE45,225:POKE46,35"
1120 PRINT"{DOWN}{DOWN}SAVE"CHR$(34)P$CHR$(
34)","DV
1125 IFDV=8THENS$="S:"+P$:OPEN1,8,15,S$:CLO
SE1
1130 POKE631,19:POKE632,13:POKE633,13:POKE1
98,3:POKE646,C

READY.
```

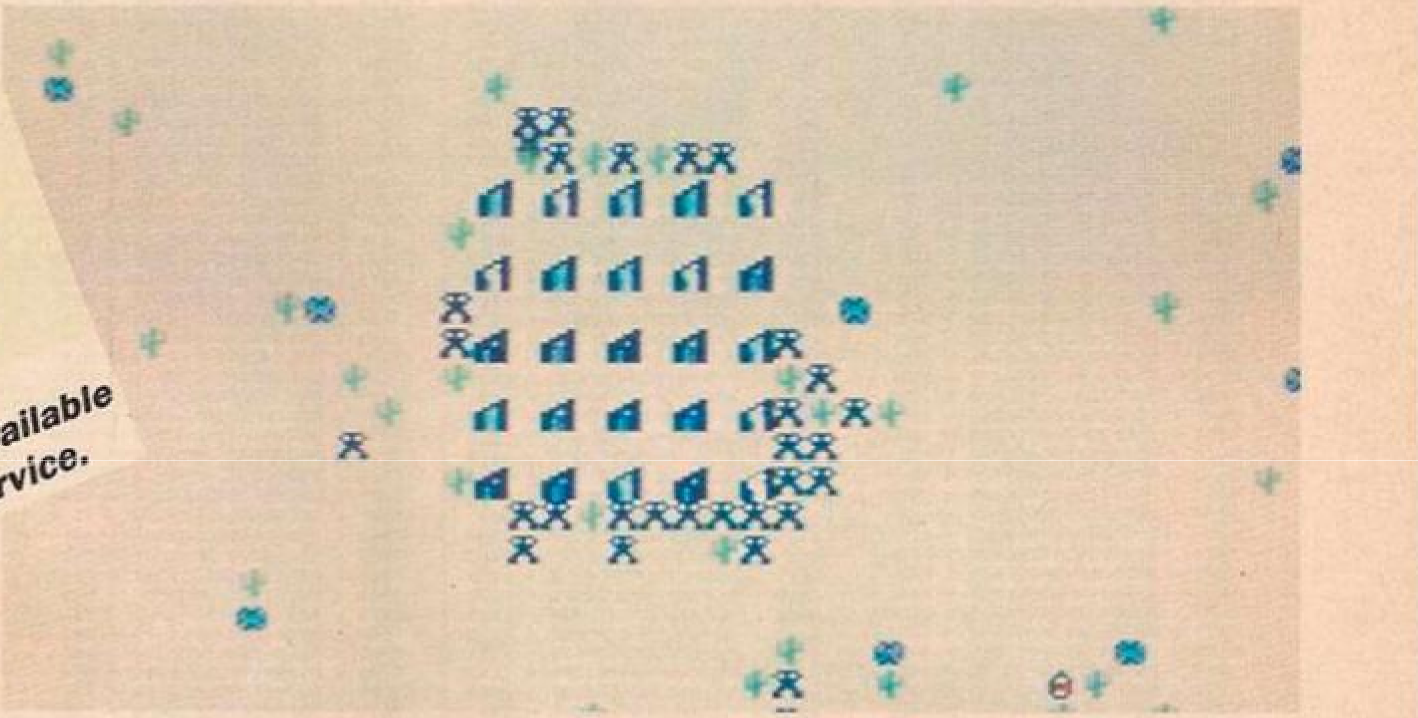
Listing 2.

```
2049 : 0C080C1079E203230 - 508
2057 : 3632000000A20000D - 455
2065 : 38009D00C4E8E0C0 - 1068
2073 : D0F5A2000BDF8009D - 1220
2081 : 00C8CAD0F7BDF009 - 1306
2089 : 9D00C9CAD0F7BDF8 - 1455
2097 : 0A9D00CACAD0F74C - 1102
2105 : 330000000003C0000 - 122
2113 : 3C000080D0000FF00 - 504
2121 : 0000000000000000 - 0
2129 : 0000000000000000 - 0
2137 : 0000000000000000 - 0
2145 : 0000000000000000 - 0
2153 : 0000000000000000 - 0
2161 : 0000000000000000 - 0
2169 : 00C2000000000000 - 194
2177 : 0000000000000000 - 0
2185 : 0024000002600060 - 170
2193 : 0000000000000000 - 0
2201 : 0000000000000000 - 0
2209 : 0000000000000000 - 0
2217 : 0000000000000000 - 0
2225 : 0000000000000000 - 0
2233 : 00F2000000000000 - 242
2241 : 0000000000000000 - 0
2249 : 0024000006400006 - 142
2257 : 0000000000000000 - 0
2265 : 0000000000000000 - 0
2273 : 0000000000000000 - 0
2281 : 0000000000000000 - 0
2289 : 0000000000000000 - 0
2297 : 00D03C666E6E6062 - 784
2305 : 3C007CC6C6FEC6C6 - 1230
2313 : C600FCC6C6FCC6C6 - 1494
2321 : FC007EC0C0C0C0C0 - 1338
2329 : 7E00FCC6C6C6C6C6 - 1368
2337 : FC007EC0C0F8C0C0 - 1394
2345 : 7E007EC0C0F8C0C0 - 1268
2353 : C0007EC0C0C0CEC0 - 1292
2361 : 7E00C6C6C6FEC6C6 - 1370
2369 : C6007830303030 30 - 558
2377 : 7800060606060 6C6 - 348
2385 : 7C00C6CCD8F0D8CC - 1402
2393 : C600C0C0C0C0C0C0 - 1350
2401 : 7E00ECD6D6C6C6C6 - 1384
2409 : C600C6F6DEC6C6C6 - 1458
2417 : C6007CC6C6C6C6C6 - 1312
2425 : 7C00FCC6C6FCC0C0 - 1408
2433 : C0007CC6C6C6C6D8 - 1324
2441 : 6600FC0606FCC0C6 - 1008
2449 : C6007EC0C0FE0606 - 974
2457 : FC007E1010101010 - 498
2465 : 1000C6C6C6C6C6C6 - 1212
2473 : 7E00C6C6C6C6C66C - 1224
2481 : 3800C6C6C6C6D6D6 - 1276
2489 : EC00C6C66C386CC6 - 1102
2497 : C600C6C6C67E0606 - 930
2505 : 7C007C060C183060 - 434
2513 : 3E003C3030303030 - 362
2521 : 3C003844BAA2BA44 - 786
2529 : 38003C0C0C0C0C0C - 176
2537 : 3C0001051D797D6D - 450
2545 : 6D6D185A5A5E7818 - 660
2553 : 1000000000000000 - 24
2561 : 00001C3030300030 - 236
2569 : 3000666666000000 - 354
2577 : 00006CFE6C6CFE6C - 940
2585 : 000010FED0FE10FE - 1032
2593 : 1000606600C183066 - 408
2601 : 0600F8D8D876DCDC - 1244
2609 : F600181818000000 - 318
2617 : 00000C1830303018 - 204
2625 : 0C0030180C0C0C18 - 144
2633 : 3000006C38FE386C - 630
2641 : 000000101 07E1010 - 222
2649 : 0000000000003030 - 112
2657 : 1030000000 7E7E00 - 332
2665 : 0000000000003030 - 112
2673 : 3000000060C183060 - 242
2681 : C0007CC6CED6E6C6 - 1362
2689 : 7C00103070303030 - 444
2697 : 78007CC6067CC0C0 - 956
2705 : FE007CC6061C06C6 - 814
2713 : 7C000CCCCCCCFE0C - 1014
2721 : 0C00FEC0C0FC06C6 - 1106
2729 : 7C007CC6C0FCC6C6 - 1286
2737 : 7C00FE0C18303030 - 550
2745 : 30007CC6C67CC6C6 - 1080
2753 : 7C007CC6C67E06C6 - 974
2761 : 7C00003030003030 - 348
2769 : 0000003030003030 - 224
2777 : 10300C1830603018 - 332
2785 : 0C0000007E007E00 - 264
2793 : 000060301800C1830 - 252
2801 : 6000FEC61E100018 - 626
2809 : 10000000FFCFC0F - 550
2817 : 00000000E03F3FE0 - 574
2825 : 000018181818107E - 246
2833 : 666666667E181818 - 606
2841 : 18187C927C386CC6 - 804
2849 : 6C00006CBAAAD6BA - 972
2857 : 6C0010284454544 4 - 468
2865 : 3800A9002090FF4C - 732
2873 : 4D0844442E484947 - 486
2881 : 4853533A44442E48 - 550
2889 : 49474853A901A200 - 639
2897 : A00020BAFFA900A2 - 972
2905 : 3BA000200BDFFA900 - 875
2913 : A23CA000D20D5FFA9 - 1064
2921 : 0120C3FF2001FF20 - 931
2929 : B4FFA210A9009D00 - 899
2937 : D4CA10FAA90F8D18 - 1029
2945 : D4200B084C800B78 - 785
2953 : A9008D1AD0A9318D - 903
2961 : 1403A9EA8D1503A9 - 760
2969 : 008D208D08D21D0A9 - 932
2977 : C08D16D058A99480 - 1117
2985 : 00DDA9320D18D0A9 - 982
2993 : CC8D0802A9000D91 - 1066
3001 : 026070A9D040D1403 - 763
3009 : A90F8D1503A9708D - 771
3017 : 05DCA900853A0538 - 777
3025 : 853CA962053405 35 - 831
3033 : 8536A9B0853785 38 - 869
3041 : 8539A92185400541 - 787
3049 : 8542A94C85490543 - 850
3057 : A9100854C8546A9F4 - 1010
3065 : 854A8544A910854D - 883
3073 : 8547A97085488545 - 903
3081 : A91185 4E854850A2 - 852
3089 : 00BDD20CC940F006 - 922
3097 : 20D2FFE8D0F3A93C - 1409
3105 : 85F8A90D85FCA907 - 1127
3113 : 8D0602A200A000A9 - 768
3121 : 0D20D2FF8A48A200 - 890
3129 : A91D20D2FFCAD0FA - 1355
3137 : 68AA81F820D2FFC8 - 1399
3145 : C010D0F618A5F869 - 1207
```

Decision



This program is available on the Telsoft service.



```
3153 : 1085FBA5FCA90085 = 1055
3161 : FCE8E00AD0CFA9EC = 1530
3169 : 85FBA90D85FCA901 = 1121
3177 : 8D8602A90D20D2FF = 956
3185 : A20CA0001020F0FF = 885
3193 : A000A20A8A48A000 = 702
3201 : A219A91D20D2FFCA = 1084
3209 : D0F8A0028 1FB4A4A = 1194
3217 : 4A4A093020D2FFB1 = 879
3225 : FB290F093020D2FF = 861
3233 : 8810E968AAA90D20 = 873
3241 : D2FF18A5FB690385 = 1146
3249 : FBA5FC690085FCCA = 1360
3257 : D0C2A2008D0D0E20 = 812
3265 : D2FFE8E023D0F5AD = 1582
3273 : 00DC2910D0F94C05 = 815
3281 : 1293111199 1D1D1D = 439
3289 : 1D1D1D1D1D1D1D1E = 233
3297 : 5F209E4445534552 = 656
3305 : 5420204445434953 = 508
3313 : 494F4E1E205F0D9E = 558
3321 : 111111 1D1D1D1D1D = 196
3329 : 1D1D1D1D42592042 = 369
3337 : 5552484841524420 = 561
3345 : 4D45494552203139 = 508
3353 : 38350D111111 1D1D = 231
3361 : 1D1D1D1D1D1D1D1D = 232
3369 : 1D1D1D1D0548414C = 334
3377 : 4C204F462046414D = 501
3385 : 450D40504C454153 = 519
3393 : 452049474E4F5245 = 553
3401 : 2E2E2E5448495320 = 482
3409 : 544550542E2E2E2E = 509
3417 : 2E2E2E4245434155 = 490
3425 : 5345204954204953 = 529
3433 : 20534F53454E5345 = 576
3441 : 4C45535320544F2E = 552
3449 : 2E2E2E4C4F4F4B20 = 479
3457 : 41542E2E2E2E2E2E = 425
3465 : 2E2E2E5A45524F20 = 490
3473 : 53434F5245532E2E = 555
3481 : 2E2E2E2E2E2E2E2E = 368
3489 : 2E2E2E2E2E2E2E2E = 368
3497 : 2E2E2E50533A574F = 525
3505 : 4C46454E42554554 = 597
3513 : 54454C4752554553 = 619
3521 : 53542044454E2052 = 528
3529 : 4553544445522057 = 574
3537 : 454C54212E2E2E2E = 446
3545 : 2E2E2E2020202020 = 298
3553 : 2020202020202020 = 256
3561 : 2020200000000000 = 96
3569 : 0000000000000000 = 0
3577 : 0000000000000000 = 0
3585 : 0000000000000000 = 0
3593 : 00000000D0D9A1D = 209
3601 : 1D1D1D1D1D1D5052 = 336
3609 : 4553532046495245 = 561
3617 : 20425554544F4E20 = 540
3625 : 544F20504C415990 = 649
3633 : 93991D1D1D1D4752 = 569
3641 : 4541542053434F52 = 561
3649 : 45202D20454E5445 = 470
3657 : 5220594F5552204E = 559
3665 : 414D45202120000B = 455
3673 : A200A9EC85FBA90D = 1133
3681 : 85FCA002B91A00D1 = 967
3689 : FBF0048007900088 = 966
3697 : 10F230034C8D0E18 = 564
3705 : A5FB690385FBA5FC = 1325
3713 : 690085FCE8E00AD0 = 1164
3721 : D94C8D0B602A9DC = 1016
3729 : 8560A90D8561A9DC = 1030
3737 : 38E91085 62A90DE9 = 951
3745 : 008563A90A856438 = 700
3753 : E9038566A90E8565 = 888
3761 : E9008567A20AA00F = 816
3769 : B16291600810F9A0 = 1077
3777 : 02B1669164 8810F9 = 927
3785 : A562856038E91085 = 930
3793 : 62A5638561E90085 = 958
3801 : 63A566856438E903 = 891
3809 : 8566A5678565E900 = 970
3817 : 8567CAE402D0C7A0 = 1235
3825 : 0FA92E91600810FB = 874
3833 : A002B91A00916488 = 754
3841 : 10F8A2008D300E20 = 709
3849 : D2FFE0E026D0F5A2 = 1574
3857 : 05A00C1820F0FFA9 = 897
3865 : 0085CCA207A9FF9D = 1087
3873 : 00CDCA10FAA000A9 = 1082
3881 : 0085CC85CFA90385 = 982
3889 : CD9848 20E4FF8502 = 1079
3897 : 68A8A502C90DF025 = 930
3905 : C914D00BC000F0E9 = 1105
3913 : 8820D2FF4C200FC0 = 956
3921 : 10F0DEC92090DAC9 = 1274
3929 : 5B80D6994003C820 = 933
3937 : D2FF4C200F8402A9 = 899
3945 : 0185CCA90185CFC0 = 1040
3953 : 00F00CA000894003 = 664
3961 : 9160C8C402D0F620 = 1125
3969 : E4FFC900D0F9A90A = 1320
3977 : A243A008200DFFA9 = 1045
3985 : 01A208A00F208AFF = 819
3993 : 20C0FFA90120C3FF = 1131
4001 : A901A208A00220BA = 720
4009 : FFA900A238A00B20 = 856
4017 : BDFFA93C85FBA90D = 1239
4025 : 85FCA9FBA20AA00E = 1151
4033 : 20D8FFA90120C3FF = 1155
4041 : A90D20D2FF4C8B08 = 953
4049 : 00070EA2008549 85 = 570
4057 : 50854C8551853AD0 = 998
4065 : 50A0008607BDD10F = 794
4073 : AA81509D01D4C886 = 1131
4081 : 0881509D00D4A607 = 807
4089 : C88150953AA608A4 = 1082
4097 : 07893400 9D05D4B9 = 803
4105 : 37009D06D4894000 = 679
4113 : 9D04D418A6078549 = 824
4121 : 69039549854C6900 = 692
4129 : 954C853AD0088543 = 931
4137 : 95498546954C4C41 = 839
4145 : 10D63AD008BDD10F = 920
4153 : A0854029FE9904D4 = 1077
4161 : E8E003F0034CD60F = 1087
4169 : 4C31EA1A140822CF = 654
4177 : 0C1A140415ED081A = 354
4185 : 140822CF0C1A1404 = 331
4193 : 15ED081A140822CF = 561
4201 : 0C20DB0422CF0827 = 555
4209 : 12082BDB1022CF08 = 553
4217 : 0000082BDB0C2712 = 339
4225 : 042BDB082E760834 = 498
4233 : 27102E76082BDB08 = 497
4241 : 27121027120C2712 = 199
4249 : 042712100000081A = 111
4257 : 140827120C2BDB04 = 363
4265 : 27120822CF0820DB = 565
4273 : 081D45081A140820 = 200
4281 : DB0827120C22CF04 = 541
4289 : 2712082BDB082E76 = 499
4297 : 1027120828DB0C27 = 402
4305 : 120428DB082E7608 = 464
4313 : 3427103A8A082E76 = 475
4321 : 082BDB1027121022 = 393
4329 : CF10000081A1408 = 285
4337 : 000000000081167 = 128
4345 : 1000001011671000 = 168
4353 : 001011670C130904 = 308
4361 : 15ED081A140822CF = 561
4369 : 101A140000000022 = 112
4377 : CF0C1A140415ED08 = 535
4385 : 1A14081167101167 = 310
4393 : 0815ED081A14101A = 362
4401 : 140C1A14041A1410 = 144
4409 : 0000101A14101A14 = 124
4417 : 101A14100000101A = 120
4425 : 14101A14101A1410 = 160
4433 : 00001022CF0C1A14 = 315
4441 : 0415ED081A140811 = 341
4449 : 6710173808173808 = 299
4457 : 1A14101A14101167 = 244
4465 : 1000001000000000 = 32
4473 : 000815ED10000010 = 298
4481 : 15ED100000101A14 = 336
4489 : 101A14081A140811 = 141
4497 : 671015ED08000000 = 393
4505 : 22CF0C20DB0422CF = 749
4513 : 0827120820DB1027 = 390
4521 : 120822CF0820DB10 = 542
4529 : 20DB0C20DB0420DB = 769
4537 : 1000001020DB0C22 = 329
4545 : CF0420DB081D4508 = 576
4553 : 1A14101A141020DB = 375
4561 : 0C1D450420DB0822 = 407
4569 : CF08271210 20DB08 = 555
4577 : 22CF0C20DB0422CF = 749
4585 : 08271208 2BDB102E = 397
4593 : 760827120822CF10 = 448
4601 : 20DB1022CF100000 = 524
4609 : 10000000A2028DEC = 605
4617 : 0D951DCA10F84C30 = 781
4625 : 1253434F52454849 = 543
4633 : 4748205343 4F5245 = 555
4641 : 4C49564553904741 = 667
4649 : 4D45204F564552A9 = 663
4657 : 018503853 1A90385 = 624
4665 : 04A202A900951ACA = 714
4673 : 10F8A9038532A940 = 855
4681 : 8534A9018535A900 = 710
4689 : 853620FE12A9FF8D = 1056
4697 : 0FD4A9818D12D4A2 = 1058
4705 : 05A0058 6FB84FC98 = 1091
4713 : 0A18690DA88A0A18 = 492
4721 : 6904AA1820F0FFAD = 1003
4729 : 18D42907090008D06 = 579
4737 : 02A95E20D2FFA6FB = 1179
4745 : A4FC08D0D6A005CA = 1341
4753 : D0D118A216A00020 = 817
4761 : F0FFA9078D8602A2 = 1110
4769 : 008D121220D2FFE8 = 954
4777 : E005D0F520D61318 = 971
4785 : A216A01720F0FFA2 = 1056
4793 : 058D121220D2FFE8 = 959
4801 : E00FD0F520E31318 = 994
4809 : A218A00F20F0FFA2 = 1050
4817 : 0F8D121220D2FFE8 = 969
4825 : E014D0F5A5041869 = 995
4833 : 308DD5CF4C1014A9 = 890
4841 : 008507A208460590 = 529
4849 : 031865066A6607CA = 551
4857 : D0F3850860A50109 = 863
4865 : 078501A9008D15D0 = 680
4873 : 2084FFAD0EDC0900 = 963
4881 : 8D0EDCAD0FDC297F = 951
4889 : 8D0FDCA9008D08DC = 917
4897 : 8D0ADC8D09DC8D08 = 890
4905 : DCA9008D20D0AD16 = 965
4913 : D0091 08D16D0A900 = 773
4921 : 8D22D0A90E8D23D0 = 950
4929 : A9CC8D0802A9038D = 965
4937 : 8602A99320D2FFA9 = 1118
4945 : 948D00DDA9328D18 = 894
4953 : D078A9808D1403A9 = 966
4961 : 138D1503A9E18D12 = 737
4969 : D0AD11D0297F8D11 = 932
4977 : D0A9818D1AD058A2 = 1131
4985 : 17A9009D00D4CA10 = 779
4993 : FAA90F8D18D460AD = 1080
5001 : 19D08D19D03007AD = 835
5009 : 0DDC504C81EAAD12 = 951
5017 : D0C9E19008A9008D = 1099
5025 : 21D08D12D04C81EA = 1047
5033 : A9078D21D0A9E18D = 1093
5041 : 12D04C81EAA002B1 = 1004
5049 : 274A4A4A4A186930 = 512
5057 : 9D76CF8127290F18 = 778
5065 : 6930E89D76CF88E8 = 1235
5073 : C0FFD0E360A90085 = 1280
5081 : 28A91A8527A2004C = 645
5089 : B613A9008528A91D = 741
5097 : 8527A21C4CB613A0 = 799
5105 : 0838E50508260606 = 356
5113 : 072A209005E5054C = 540
5121 : 05146505 88D0ED80 = 888
5129 : 036505182606 60A9 = 442
5137 : 058D8602A9008519 = 609
5145 : AD18D4293FC91680 = 915
5153 : F78509AD18D4293F = 905
5161 : C92080F7850AA509 = 981
5169 : C9069011C90F800D = 773
5177 : A50AC90F9007C918 = 767
5185 : B0034C19148A48A6 = 676
5193 : 09A0288605840620 = 518
5201 : E81218A507650A85 = 690
5209 : 07A50869CC8508A0 = 790
5217 : 008107C920F00568 = 766
5225 : AA4C19141 8A609A4 = 654
5233 : 0A20F0FFA9008D04 = 851
5241 : D48D05D4A9508D05 = 965
5249 : D4A9818D04D4A946 = 1106
5257 : 8D01D4A95F20D2FF = 1115
5265 : A50785FBA50885FC = 1114
5273 : 20AA1AA014A200CA = 772
5281 : D0FD88D0FA68AAA9 = 1498
5289 : 008D04D4A519C532 = 794
5297 : F0034C1914A9068D = 680
5305 : 8602A20A8623AD18 = 677
5313 : D4293FC91680F785 = 1095
5321 : 09AD18D4293FC920 = 766
5329 : B0F7850AA509C906 = 947
5337 : 9011C90F800DA50A = 741
5345 : C90F9007C918B003 = 771
5353 : 4C8F148A48A609A0 = 832
5361 : 2886058406 20E812 = 599
5369 : 18A507650A8507A5 = 612
5377 : 0869CC8508A00081 = 795
5385 : 07C920F00568AA4C = 835
5393 : 8F1418A609A40A20 = 616
5401 : F0FFA9008D04D48D = 1162
5409 : 05D4A9548D05D4A9 = 997
5417 : 218D04D4A9468D01 = 771
5425 : D4A96520D2FFA064 = 1239
5433 : A200CAD0FD88D0FA = 1419
```

(continued on next page)

Desert Decision

(continued from previous page)

```
5441 : 68AAA5079DFFC2A5 = 1217
5449 : 089D09C3A5099D13 = 719
5457 : C3A50A9D1DC3A900 = 920
5465 : 8D04D4CAF0034CBF = 1069
5473 : 14A20A860BA9000D = 647
5481 : 8602AD18D4293FC9 = 853
5489 : 1680F78509AD1BD4 = 999
5497 : 293FC9280F7850A = 911
5505 : A509C9069011C90F = 758
5513 : B00DA50AC90F9007 = 731
5521 : C918B0034C6B158A = 746
5529 : 40A609A020860584 = 718
5537 : 0620EB1218A50765 = 585
5545 : 0A8507A50869CC85 = 765
5553 : 08A0008107C920F0 = 825
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BETA BASIC 3.0

SINCLAIR USER, JAN. 85 (ABOUT RELEASE 1.8): "HAS ESTABLISHED ITSELF AS THE STANDARD EXTENDED BASIC FOR THE SPECTRUM.....TURNS SINCLAIR BASIC FROM A GOOD VERSION OF THE LANGUAGE TO A FANTASTIC ONE..." NOW, WITH RELEASE 3.0, BETA BASIC BECOMES PROBABLY THE MOST POWERFUL BASIC AVAILABLE ON ANY 8-BIT MICRO!

- PROCEDURES - a very full implementation that lets you extend Basic easily. With parameter passing by value or by reference (including arrays), LOCAL variables, recursion, DEFAULT parameter values, and the ability to handle parameter LISTS of any length. No PROC keyword is needed; e.g. you can use things like: swap a,b or draw_box 10,20,5 or addup b(),sum.
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```
  10 FOR n=1 TO 10: PRINT n: NEXT n
as:   10 FOR n=1 TO 10
           PRINT n
         NEXT n
```

- KEYWORDS can all be entered by typing them in full, or by the "single entry" method, or both in the same line; e.g. the line: 10print"hello":if x=1 THEN goto 100 will be recognised and listed normally.
- Upgrades to Release 1.8 customers: If you bought direct from us, there is no need to return your cassette - just quote the (approximate) original purchase date with your order; otherwise return your cassette and name your supplier. The upgrade price of £6.95 (£7.50 overseas) includes a new manual.
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Megamon

John Mullins' program takes you on a trip to the secret heart of the Spectrum

Megamon is a sophisticated disassembler/monitor which works on the Sinclair Spectrum and Spectrum +. Among its many features are an intelligent move memory facility, read or write object code to tape, full memory dump to the printer and a disassembly that will even understand all of the 102 undocumented Z80 instructions. All of the controls are accessed through single key-presses so Megamon is easy to understand and simple to use.

Listing 1 is the short loader program for Megamon. Type this in and save it as the first thing on your tape as "MEGAMON". Listing 2 is the standard hex-loader program. Simply type it in, save it, then run it. When all of the bytes have been successfully entered then the loader program will prompt you to hit any key when ready to save the code. Ensure your tape is positioned after the Megamon basic loader.

To run the program rewind the tape and type 'Load "MEGAMON"'.

When the program has loaded the title screen will appear and you will be asked for an address at which to load Megamon. This can be any address from 7000H up to E000H.

Once the address has been entered the object code for Megamon is loaded and you will be presented with Megamon's Front Panel screen display.

Z80 Registers — The top right of the screen shows the Z80 registers AF,BC,DE,HL, IX,IY together with the stack pointer (SP) and the program counter (PC). The register contents are shown (at start-up these are always zero) and then the contents of the memory location addressed by that register. There is also the register cursor (">"), which points to AF on start-up. Its use will be discussed shortly.

Memory Display — The memory display occupies the bottom of the screen and its purpose is to display the bytes around the memory pointer, indicated by ">". The bytes can be displayed either as hex or as Ascii.

PC Instruction — The instruction at the Program Counter is constantly displayed above and to the left of the Memory Display.

List Display — The left of the screen above the Memory Display is taken up by the List Display. At start-up this display will be blank, but if you are eager to see it in action then for the moment press 'L' followed by a full-stop. You will see the 14 instructions from address zero disassembled for your perusal.

Unfortunately space does not permit a detailed discussion of the undocumented instructions, needless to say their use is becoming much more frequent in many of today's top games. Disassemblers that can cope with them are rare and the format for displaying them varies. For example, look at the instruction: ADD A,AXL.

This means "add A to the low-byte of IX", the "L" tagged on to indicate the low-byte. Alternatively, you can use: ADD A,IXH.

This means "Add A to the high byte of IX", ie add A to I. Megamon would display the two instructions above as follows:

(i) ADD A,iX
(ii) ADD A,Ix

The letter in capitals indicates which byte of the register pair is being operated upon. The same applies to all undocumented instructions that use the IY register pair.

Here is a list of the Megamon keys and a full explanation of their usage.

The Four Cursor Keys: (Shift and 5,6,7, or 8). The four cursor keys above the function paid are used to move the Memory Pointer ">" within the Memory Display in the appropriate direction, allowing you to step up or down through the memory in steps of one or eight bytes at a time.

The Full Stop (Symbol Shift and "m"): Pressing the full stop will advance the Register Cursor ">" on to the next register pair in the Register Display.



B — Return to Basic: Pressing this key will produce the prompt "Are you sure?". In response to this press "Y" if you wish to leave Megamon and return to Basic. Any other key press will return you back to Megamon itself.

C — Clear List Window: The List Window can be cleared at any time by pressing the "C" key.

D — Display Memory: This allows you to change the address around which the Memory Display works. You will be asked for a new address

Listing 1.

```
   1 REM *********************
   2 REM *       MEGAMON       *
   3 REM *     THE MONITOR     *
   4 REM *********************
  10 BORDER 1: INK 7: PAPER 1: C
LS
  20 PRINT AT 1,6;"SPECTRUM MEGA
MON"
  30 PRINT AT 2,5;"[redacted]"
  40 PRINT AT 4,8;"© LAJ 1985"
  50 INPUT "LOAD ADDRESS ? ";a
  60 LET high=INT (a/256): LET l
ow=a-256*high
  70 POKE 65535,high: POKE 65534
,low
  80 CLEAR a-1
  85 PRINT AT 10,0;"PLEASE WAIT
- LOADING MEGAMON"
  90 LET A=256*PEEK 65535+PEEK 6
5534
 100 LOAD "MEGA"CODE A
9997 STOP
```

Listing 2.

```
 200>CLEAR 54999
 210 DEF FN H(H$)=16*(CODE H$(1)
-48-(7 AND H$(1)>"9"))+CODE H$(2
)-48-(7 AND H$(2)>"9")
 220 RESTORE 1000
 225  LET address=55000: LET x=1
000
 230 READ a$,check
 233  IF a$="END"  THEN  GO TO 5
00
 235  LET tot=0
 240 FOR z=1 TO LEN a$ STEP 2
 250 LET byte =FN H(a$): LET tot
 = tot +byte
 260  POKE address,byte
 265  LET address=address+1
 266  LET a$=a$(3 TO )
 270  NEXT z
 275  IF tot<>check  THEN  PRINT
 "ERROR IN LINE ";x;" TRY AGAIN"
: STOP
 278  LET x=x+10
 280  GO TO 230
 500  PRINT "DATA CORRECT"
 510  SAVE "MEGA"CODE 55000,6670
1000 DATA "3EC9320040F3CD004030З
BE111F7FF1911F015EB",2209
1010 DATA "19E5DDE1DD6E00DD66017
C0520102319E5FDE1FD",2744
1020 DATA "6E00FD6601119FD7500FD7
401DD23DD2318DEFD21",2275
1030 DATA "3A5C3AD5000332D50032E
E0BC60432F5003EC312",1919
1040 DATA "21560022010 0ED733E173
16010CD150ECD070CCD",1557
1050 DATA "BA0ACD4A0ACD5F0ACDF01
4CD740010EC210E0001",2017
1060 DATA "1600FE613002D620ED01C
0090909 5E2356D52A08",1788
1070 DATA "16C942430B0A080092E495
2504 64D444C53544750",1292
1080 DATA "40414F57F1120912D611A
0114E11500E220F290F",1302
1090 DATA "D000C90C000D5C0D090D9
20D070DC00DCD0DD00D",1699
1100 DATA "D000D30DE000DE90D3E0FC
DA600C5DDE13007C0DD",2514
1110 DATA "2A0A16100620 04DD2A061
6AF32121 63E00CDC307",1165
1120 DATA "CDC4150 60EDD220A16CDF
F0010F7C9DDE5D1CD56",2683
1130 DATA "003A121 63D20273E17D73
E05D73E000D7DDE5C5CD",1952
1140 DATA "341141DD7E000D023CD030
B10F63E17D73E0ED7AF",2112
1150 DATA "D7C1DDE110053E0032391
73E01321616C5AF321A",1608
1160 DATA "16DD7E00FEDD2005CD000
41043FEFD200A3E0132",1051
1170 DATA "1A16CD00041035FECB200
5CD00061 02CFEED2005",1779
1180 DATA "CD9605 1023FE403009FE0
0300ACDD5021016CDCC",2117
1190 DATA "021011FEC03005CDA5021
000E607110103CDE402",1639
1200 DATA "3A1316B72023CD7D0278F
E202011CD0D0179FE20",1946
1210 DATA "20093E2CCD6A0279CD0D0
13E0DCD6A023E0ACD6A",1755
1220 DATA "02DD23C1C9FE513021FE5
92009C5ED4B1A1601C1",2339
1230 DATA "1010FE6020F3FE593000C
```



for the Memory Pointer — this must be entered as a hex number terminated by Enter. If instead of a hex number you press the full stop key then the Memory Pointer will be set to whatever address the Program Counter currently holds.

The address is displayed along with its contents. You can either enter a new hex number for this location or press Symbol Shift and "z" (colon) to exit the memory change. When a new number is entered the memory pointer is advanced to the next location and your options are the same again. At any time during the input of a number you can press the colon keys to abort and leave the Memory Pointer unchanged.

F — Fill Memory: The prompt "Fill >" appears and the number entered here will be the "start" address for the program to use. You are then asked for the address at which the program will end its "fill" and finally the byte to fill the memory with. For example, if you enter 8000 in response to "Fill >", 8100 in response to "To >", and FF in response to "With >", the memory between 8000 hex and 8100 hex will be filled with FF (255 decimal).

B — Go: This allows you to execute the object code currently under examination with the use of "breakpoints", ie, places at which the object code is stopped in its tracks and control returned to the monitor for you to examine the registers etc. The address which you enter in response to "Go >" will be the address at which the monitor starts execution of the object code. As usual with all prompts, if you press the colon keys then the operation will be aborted. You are then asked for an address "To >" at which control will be returned to Megamon, ie the address at which you wish your "breakpoint" to be inserted.

When you have entered this address Megamon will go off and execute the code. When the breakpoint has been reached, assuming that the code has not caused a fatal crash, a small line will be displayed on the screen and this means that Megamon is waiting for you to press any key before updating all of its displays.

H — Search for String: The prompt "Search For >" is displayed. You can now enter a sequence of up to 255 bytes which will form the string which Megamon will search for. Each number should be entered by pressing Enter and by pressing Enter on its own you will terminate the string.

At this stage, assuming the string can be found, Megamon will update the Memory Display and the Memory Pointer ">" will be pointing to the second byte of the input string. Also see the explanation of the next instruction, "A".

A — Find Next Occurrence: Pressing the "A" key will tell Megamon to find the next occurrence of a string you have searched for using "H".

I — Toggle between Ascii and Hex: By pressing the "I" key you can toggle the Memory Display Memory Display so that it shows either Hex or the Ascii equivalents.

L — List: You can enter a new address from which the disassembler will list its 14 instructions. But there are two other alternatives to entering a new address. If you press the full-stop key in response to "List >" the disassembly will begin from the address currently held in the Program Counter. Alternatively, you can press Enter in response to the prompt and the disassembly will continue from where it left off.

M — Move a Block of Memory: The prompt "Move >" will be displayed and the address you enter will be the start of the memory block you wish to move. The prompt "End >" asks you for the end address of the memory block and the prompt "To >" asks you for the destination address for this block.

The routine is "intelligent" so that if your destination address lies within the limits of the block you wish to move Megamon takes this into account and performs the move correctly.

O — Read Object Code: This reads a block of object code in from tape. You are prompted to enter a file name and then an address at which the code will be loaded. Obviously you should take care not to overwrite Megamon.

P — Printer Disassembly: With this option you can produce a disassembly of any length to your printer; you could even list the Spectrum Rom. The first address you enter, in response to "Print >", is the start address for the disassembly and the second address is the end.

Assuming the printer is connected a disassembly will now appear on the printer which can be aborted at any time b y pressing the Break key.

R — Change Register: By pressing the "R" key you can change the value of the register pair currently pointed to by the register cursor ">". The register pair will take on the value you enter at the keyboard.

S — Single Step: Megamon will execute the current instruction at the Program Counter when you press the "S" key, allowing you to examine the effects of the code upon the registers and memory. This function will also single-step through a Call instruction.

T — Trace: If you press the "T" key Megamon will execute the instruction at the Program counter in the same way as the "S" function above, except that using "T" allows you to execute a Call instruction automatically, as opposed to single-stepping through it.

W — Write Object Code: This writes a block of code to tape under a given filename. You are prompted to enter the filename and then the first and last (inclusive) addresses of the block you wish to write.

X — Toggle Alternate Registers: Pressing the "X" key will toggle the Register Display between AF,BC,DE, HL and the alternate registers AF' ,BC' ,DE' ,HL'.

Megamon is available on tape for £3.50, postage included, from John Mullins, 6 Haslewood Place, Eber Gardens, Leeds LS9 7PJ.

```
5ED401A160101C1CD31",2344
1240 DATA "0EC9FE103006C61ECD310
EC920193A1616A72007",1609
1250 DATA "7BC630CD6A02C90E203E2
3CD6A0270CD0300C9FE",2264
1260 DATA "1920080E203E23CD6A02C
D5600C9FE1A20133E20",1460
1270 DATA "CD6A023E23CD6A02CD560
03E29CD6A02C9FE1020",1955
1280 DATA "143E20CD6A023E23CD6A0
270CD03003E29CD6A02",1731
1290 DATA "C9FE1C20203E20CD6A023
A1A16C659CD310E3E20",1720
1300 DATA "CD6A023E23CD6A027CCD0
3003E29CD6A02C9F53A",2114
1310 DATA "12163D2006F1CD5F13A7C
9F1FE0AC0D7C9E57DCD",2755
1320 DATA "310E3A1216B720043E0F1
0143D200F7DFE372000",1091
1330 DATA "3E17D73E15D7AFD7E1C93
E06323917E1C90F0F0F",2003
1340 DATA "E607C6396FDD7E00CDA90
7DD7E00FE9030040607",2141
1350 DATA "180DFEA03006FE9030021
0F2410E20C9E60711F1",2042
1360 DATA "02CDE402C9FE762E10012
02020052E11CDA907C9",1027
1370 DATA "076F2600197E23666FDD7
E00E9D0067E07210771",1742
1380 DATA "075007600764079D07BA0
30903C4034003D70321",1322
1390 DATA "03D003F903C005CE05DD0
5EC0506061106230644",1496
1400 DATA "06CB5F200C2E50CD05077
0FE00C00651C92E4E06",1870
1410 DATA "19DD5E01DD5602DD23DD2
3C9FEC320062E4D0619",2004
1420 DATA "10EBFED320082E5306100
E07100AFEDB200C2E54",1620
1430 DATA "06070E10DD5E01DD23C9F
EE320072E55060F0E0A",1523
1440 DATA "C9FEEB20072E5506090E0
AC9012020FEF320032E",1743
1450 DATA "56C92E57C9CB5F200C2E5
0CD050770FE00C00651",2146
1460 DATA "C9FEC901202020032E4CC
9FED920032E52C9FEE9",2401
1470 DATA "20052E4D060EC92E11060
B0E0AC92E4CCD160770",1162
1480 DATA "C61047C92E4DCD16070E1
9DD5E01DD5602DD23DD",1904
1490 DATA "2310E02E4E10E00F0F0FE
607C6396F06070E10DD",1594
1500 DATA "5E01DD23FE382004410E2
0C9FE3DD010F7E6382E",2146
1510 DATA "4F3F06100E203E0132161
6C9DD7E01FECB2020DD",1698
1520 DATA "7E03E607FE06DD23C2520
5DD23CD00063E060920",2051
1530 DATA "040E1C1002061CDD66FFC
9FE40D2F504DD23E607",2155
1540 DATA "CA5205FE07CA5205FE012
01ADD7E00CD7E073E0A",1909
1550 DATA "B9200A002009DD2BDD2BC
352050E590659C9FE02",1933
1560 DATA "2023DD7E00FE222011061
A0E592E11DD5E01DD56",1572
1570 DATA "02DD23DD23C9FE2AC2520
50E1A065910E8FE0320",1972
1580 DATA "17DD7E00FE2320072E120
6590E20C9FE20C25205",1682
1590 DATA "2E1310F2FE04201CDD7E0
0CD500770FE04DA5205",1979
1600 DATA "FE07CA5205CD5D0570FE1
CC0DD6600C9FE052000",2270
1610 DATA "DD7E00CD600710DEDD7E0
0FE26200C06502E110E",1750
1620 DATA "10DD5E01DD23C9FE2E200
4065C10EEFE36C25205",2002
1630 DATA "061CDD23DD660010E0FE0
03014DD7E01FE76DD23",2207
1640 DATA "CA5205CDD502CD5D05DD6
600C9FEC0300CDD23CD",2503
1650 DATA "A502CD5D05DD6600C9DD2
3FEE120072E5006590E",2003
1660 DATA "20C9FEE520042E5010F3F
EE920062E4D066010E0",2162
1670 DATA "FEE320072E55060F0E59C
9FEF920072E1106000E",1612
1680 DATA "59C92E5F012010DD2BDD5
E00C9260079FE062005",1724
1690 DATA "DD230E1CC970FE0620050
61CDD23C970FE043009",1850
1700 DATA "FE063005C65747260179F
E043009FE063005C657",1750
1710 DATA "4F26017CA7C0E1C35205D
D23DD7E00FE00381321",2201
1720 DATA "0706011000EDB9C252057
9C6626F012020C9FE40",1973
1730 DATA "DA5205E607111103CDE40
2C92E54CDA9070E7270",1974
1740 DATA "FE06C00673C92E53CDA90
740067279FE06CA5205",2146
1750 DATA "C92E3CCB5F20022E3ACDB
50740060AC92E11CDB5",1882
1760 DATA "070E1ADD5E01DD5602DDC
B005EDD23DD23C07041",2079
1770 DATA "4FC92E74012020FE44CBC
35205012020FE452003",1734
1780 DATA "2E75C92E76FE4DCBC3520
5AF321616DD7E002E77",2122
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1840 DATA "4030130F0F0FE607C6416
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1950 DATA "5E01DD23C92E12CB5F200
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1960 DATA "CB5F20092E14CD0507400
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Megamon

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4210 DATA "EA11ED11011250005300 0
404540A30043D043E00",976
4220 DATA "42004500 4A001B0D93053
E06A300A5000B121212",862
4230 DATA "5912931288129812C50A1
50DA908090CDE0CE20D",1632
4240 DATA "EB0D8412C807CC0768 0AB
10AC80AD90A0A082108",1625
4250 DATA "330B4A080A0C8F0C3401A
0028508 7202C312C812",1278
4260 DATA "CD12DE127E1388138E13F
014E8135C145F146514",1783
4270 DATA "92149C148014A414A714B
F14C414CE14DE14C708",2014
4280 DATA "F30D1E0FA4126C00C715C
A15CD15D215D815DE15",1974
4290 DATA "E415EC154F0A4F0CE10CE
50DFE0D7D128712E512",1975
4300 DATA "EB122C13F0009614AC14C
814DA14D70710151715",1679
4310 DATA "1E1525152815 2F1539153
D1544156313E2138514",1054
4320 DATA "89142812681218123612 4
6120000000000000000",582
4330 DATA "END"
```

Telsoft

The programs given here will enable Spectrum, BBC, and CBM-64 owners to download via *Your Computer's* Telsoft service. Each month for each machine we transmit least one — and usually two — of the main programs appearing in the current issue. Also available is the full user to user communications program Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with a number of other makes. For the CBM-64 it will initially only be available with the OEL Comms pack together with the Telemod 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

Hexloader

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL &6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR 60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bits/ services.

When a program you want to

Figure 1. CBM-64.

```
5 REM   HEX LOADER FOR CBM 64   FIG.1
6 REM
10 FOR I=680 TO 727:READA:POKEI,A:T=T+A
20 NEXT:IF T=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA ";T-6716:END
40 DATA 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 68,79,87,78,76,79,65,68
100 SA=51000:LA=52855
110 INPUT"START ADDRESS";A
120 IF (A<SA) OR (A>LA) THEN GOTO 140
130 IF A/8=INT(A/8) THEN GOTO 150
140 PRINT:PRINT"ADDRESS ERROR":GOTO 110
150 T=(A-32768)AND255:PRINTA;:INPUTD$
160 IF D$="END" THEN GOTO 900
170 IF LEN(D$)=20 THEN GOTO 190
180 PRINT"WRONG LENGTH":GOTO 150
190 FOR B=0 TO 7:B$=MID$(D$,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280
210 POKE A+B,D:T=T+D:NEXT
220 B$=MID$(D$,18,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR":GOTO 150
260 A = A+8:IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B+D)C$"??"
290 B=8:NEXT:GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B$)
310 C$=MID$(B$,N,1):GOSUB 400
320 IF E=1 THEN D=N:N=4:NEXT:RETURN
330 D=D*16+X:NEXT:RETURN
400 X=ASC(C$)-48:IF X<0 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X>15 THEN E=1
440 RETURN
500 H$="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A;"? ";:T=(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT"=";
560 Y=INT(T/256):PRINT MID$(H$,Y+1,1);
570 X=255 AND T:GOSUB 600:PRINT
580 NEXT:GOTO 900
600 PRINT MID$(H$,INT(X/16)+1,1);
610 PRINT MID$(H$,1+(XAND15),1);:RETURN
800 SYS 680:C$=CHR$(34)
810 PRINT:PRINT" TO RELOAD CODE :"
815 PRINT:PRINT"  LOAD"C$"DOWNLOAD";
820 PRINTC$",1,1  (RETURN)"
825 PRINT:PRINT"  THEN TYPE   NEW";
830 PRINT"  (RETURN)"
835 PRINT:PRINT"TO RUN THE PROGRAM";
840 PRINT"  SYS 51000  (RETURN)"
900 PRINT:PRINT:PRINT"1  ENTER DATA"
910 PRINT:PRINT"2  PRINT DATA"
920 PRINT:PRINT"3  SAVE DATA"
930 INPUT Z:ON Z GOTO 100,500,800
```

Figure 2. CBM-64.

```
51000 ? A9068D211008D20D0=3E2
51008 ? A90F8D0602A90E20=2E4
51016 ? D2FFA9008D15D0A9=4DD
51024 ? FF8D0A02BA0E92CE=510
51032 ? 20CAC920C7CB20F8=4D5
51040 ? CAAD00CEC931F023=532
51048 ? C935F014C936D006=43F
51056 ? 208EC74C5BC7A914=410
51064 ? 20D2FF202FCBD0DB=52E
51072 ? 203FC8A92020D2FF=461
51080 ? 4C93C94C4AC82063=411
51088 ? CC2022CDA95B85FD=4F1
51096 ? A9CE85FE2020CDA0=547
51104 ? 002095CC202FCBC9=404
51112 ? 44F00BC954D0ED20=4E1
51120 ? D2FFA901D007A944=4EF
51128 ? 20D2FFA90885BA20=4B9
51136 ? 25CDA90820ABCCA9=4A3
51144 ? BD85FDA9CD85FEA0=6A0
51152 ? 002095CC2025CD20=383
51160 ? 95CC9848A0048C83=4CC
51168 ? CE20D8C968A82025=4C4
51176 ? CD2095CC9848A906=4C5
51184 ? 8D83CE20D8C9ADA7=5E3
51192 ? CE85FBADA8CE85FC=6EA
51200 ? 68A82060CBA90185=38A
51208 ? B885B998A293A0CE=539
51216 ? 20BDFFAEA9CEACAA=567
51224 ? CEE8D001C82025CD=479
51232 ? A9FB20D8FF20F1CB=597
51240 ? 6020D9CCC90DD00B=3FE
51248 ? A90085C7A92020D2=3E0
51256 ? FFA90D20D2FF60A9=4E7
51264 ? 0D2029C8A90D20D2=306
51272 ? FF602063CCA000A9=43F
51280 ? FF9993CEC8D0FA20=5FB
51288 ? D2CB90FB20D2CBB0=5ED
51296 ? FB8D72CEA0008C7C=4D0
51304 ? CE0C7DCE202ECCAD=4D4
51312 ? 72CE29F0C980D0E4=5C6
51320 ? 20D2CBB0DA9973CE=599
51328 ? C8202ECCC009D0F0=4EB
51336 ? A000AD76CE2980D0=492
51344 ? 0FA52B85FB18A52C=3D8
51352 ? 6D75CE85FC4CAAC8=587
51360 ? AD78CE85FBAD79CE=607
51368 ? 85FC20D2CBB0A820=55E
51376 ? D9CC20D2FFC820D9=607
51384 ? CC202ECCC010D0EA=528
51392 ? A92020D2FFAD75CE=56A
51400 ? 202ECD20D2CBB087=4D7
51408 ? CD7CCEF00BA95820=503
51416 ? D2FF2030C84C57C8=52C
51424 ? 20D2CBB0F8CD7DCE=65D
51432 ? D0EBAD75CEA8B993=687
51440 ? CED00E2030C8A991=4EE
51448 ? 20D2FF4C7FC94C57=51F
51456 ? C8A0008C7CCE8C7D=447
51464 ? CE20D2CBB0F091FB=58F
51472 ? 202ECCC8CC77CED0=4D3
51480 ? F020D2CBB0E0CD7C=59E
51488 ? CEF000A95820D2FF=4D8
51496 ? 4C57C820D2CBB0CE=4CE
51504 ? CD7DCEF0034C23C9=473
51512 ? 20ACCB2030C8AD75=409
51520 ? CEA0A3009993CEAD=506
51528 ? 84CEC902D02520BC=436
51536 ? CBA9C820F3CBA955=568
51544 ? 2016CDA95020F3CB=432
51552 ? 20C7CBAC73CEC888=54F
51560 ? B993CED02398D0F7=5D4
51568 ? 4C5BC7A9552016CD=3DF
51576 ? 20F1CB4C63C9AC77=4EF
51584 ? CE20D2CB88D0FA20=57D
51592 ? D2CB20D2CB4C47C9=53E
51600 ? 4C5CC8A52B85FBA5=4F5
51608 ? 2C85FCA000B1FB99=52A
51616 ? 2200C8B1FB8523F0=4CE
51624 ? 0BA52285FBA52385=447
51632 ? FC4C9BC918A5FB69=57D
51640 ? 02852D852F8531A5=37B
51648 ? FC6900852E853085=412
51656 ? 32602063CCA9028D=3E1
51664 ? 84CEA90B8D02DE60=4A3
51672 ? 8E81CE8C82CEA200=533
51680 ? A9098DCDCE202FCB=4D4
51688 ? C914F016C90DF051=4E2
51696 ? C924D01920D2FF8D=544
51704 ? C3CEE84CE5C9E000=64B
51712 ? D0E3E000F0DF20D2=554
51720 ? FFCA4CE5C9C93090=554
51728 ? D4C93A901548ADC3=444
51736 ? CEC924F004684CE5=460
51744 ? C968C94190BFC947=4BA
51752 ? B0BB20D2FF38E930=4D5
51760 ? C90A9002E907E005=36A
51768 ? F0AB9DC3CEE84CE5=61A
51776 ? C9E000F0A0E001D0=52A
51784 ? 07ADC3CEC924F095=4FF
51792 ? A92020D2FFA9FF9D=54F
51800 ? C3CEA2008ECFCE8E=544
51808 ? D0CE8ED1CE8ED2CE=659
51816 ? ADC3CEC924D006A9=512
51824 ? 0F8DCDCEE8BDC3CE=5DD
51832 ? C9FFF01D20CBCAA0=5B2
51840 ? 3418BDC3CE6DCFCE=524
51848 ? 8DCFCEA9006DD0CE=566
51856 ? 8DD0CEB020E84C75=534
51864 ? CAADCFCEAC83CE99=642
51872 ? A3CEC8ADD0CE99A3=660
51880 ? CEC8188C83CEAC82=561
51888 ? CEAE81CE602025CD=4ED
51896 ? A200BD41CEC921F0=500
51904 ? 0720D2FFE84CBACA=570
51912 ? 4CDEC9ADCDCE8DCE=65E
51920 ? CEADCFCE8DD1CEAD=6C1
51928 ? D0CE8DD2CE18ADD1=639
51936 ? CE6DCFCE8DCFCEAD=68F
51944 ? D2CE6DD0CE8DD0CE=6BE
51952 ? B005CECECFD0E660=625
51960 ? 2063CCA90F8D0602=414
51968 ? A95185FDA9CD85FE=575
51976 ? A000209DCC2025CD=343
51984 ? 209DCC209DCC209D=3DF
51992 ? CC2022CD20A9CC20=3A6
52000 ? 95CC2022CD2095CC=411
52008 ? 202FCB20D2FF608E=421
52016 ? 81CE8C82CE2069CC=4B0
52024 ? 20ECCC20CACCC900=48F
52032 ? D00D20FDCCC931F0=4F0
52040 ? 062001CC4C35CB8D=314
52048 ? 80CEAE81CEAC82CE=597
52056 ? 60AE92CE9A4C5BC7=4CE
52064 ? 2022CDA92285FDA9=465
52072 ? CE85FEA0002095CC=4DA
52080 ? 2025CDA000FA92099=393
52088 ? 93CE88D0FA8D93CE=619
52096 ? 202FCBC914D010C0=417
52104 ? 0AF0F520D2FF88A9=58F
52112 ? 209993CE4C80CBC9=50A
52120 ? 0DF00B20D2FF9993=4BD
52128 ? CEC8C010D0DAA920=579
52136 ? 20D2FF60A92020D2=4B4
52144 ? FFA94F20D2FFA94B=58C
52152 ? 20D2FF60A9138D00=452
52160 ? DEA9128D00DE60A9=4CD
52168 ? 538D00DEA9528D00=40E
52176 ? DE60A996188D87CE=547
52184 ? 8C82CEAC82CE2004=4D4
52192 ? CC20ECCCCE87CED0=677
52200 ? 02386020FDCCB0EE=509
52208 ? 60A9FA8C82CEA820=597
52216 ? 04CC88D0FAAC82CE=616
52224 ? 602004CC8AA2A8CA=3EE
52232 ? D0FDAA2069CC6020=454
52240 ? 25CDA90220ABCC20=364
52248 ? 95CCAD8ECE20D2FF=573
52256 ? A92020D2FFA90320=3A6
52264 ? ABCC20D8C9604D7D=48A
52272 ? CE8D7DCEA208AD7D=4AA
52280 ? CE2A9010AD7DCE49=411
52288 ? 088D7DCEAD7CCE49=460
52296 ? 108D7CCE2E7CCE2E=3D5
52304 ? 7DCECAD0E160A000=516
52312 ? A9009900D4C8C018=40E
52320 ? D0F660A99320D2FF=5B3
52328 ? 6048A5A2290FD01F=37E
52336 ? A5D448A5A22910F0=4A1
52344 ? 05A9A44C80CCA920=42B
52352 ? 20D2FFA90085D4A9=51C
52360 ? 9D20D2FF6885D468=53F
52368 ? 6020D2FFC8B1FDC9=620
52376 ? 21D0F6C8602025CD=4B9
52384 ? A90C20ABCC2095CC=46D
52392 ? 60A9058E81CEAAA9=4E6
52400 ? 2020D2FFCAD0FAAE=603
52408 ? 81CE60C914F008C9=505
52416 ? 7FF00160A91460A9=456
52424 ? 7F6020E4FFC9C190=5C4
52432 ? 07C9DBB00338E960=4AF
52440 ? 60C941900EC95B90=494
52448 ? 08C96190060C97BB0=49C
52456 ? 024920604808A4808=2D5
52464 ? 20E1FFD0034C59CB=533
52472 ? 2868AA6860AD00DE=485
52480 ? 49016A9003A90060=250
52488 ? AD01DE6048AD00DE=3C7
52496 ? 49026A6A6860200C=223
52504 ? CDB0FB8D01DE20EC=508
52512 ? CC602025CD2020CD=373
52520 ? A90D20D2FF604829=3A0
52528 ? F06A6A6A6A0930C9=3CA
52536 ? 3A30031869072 0D2=21F
52544 ? FF68290F0930C93A=31B
52552 ? 3003186907 20D2FF=2F4
52560 ? 60444F574E4C4F41=2C4
52568 ? 44204D454E552131=243
52576 ? 2020205245434549=228
52584 ? 5645213520202045=1FE
52592 ? 58495420544F2042=28A
52600 ? 4153494321362020=22F
52608 ? 2053415645204259=28A
52616 ? 5445533212820555 3=285
52624 ? 45201220535 44F50=26D
52632 ? 209220544F205245=2C4
52640 ? 5455524E20544F20=2CC
52648 ? 4D454E5520292145=28C
52656 ? 4E544552204E554D=2F9
52664 ? 4245522021494620=281
52672 ? 414444524555 35320=2E6
52680 ? 495320494E204845=2C8
52688 ? 582C119D9D9D9D9D=476
52696 ? 9D9D9D9D9D9D9D9D=5C0
52704 ? 9D9D9D9D50524546=481
52712 ? 4958205749544820=305
52720 ? 2421535441525420=2E3
52728 ? 4144445245535320=31E
52736 ? 464F522041524541=220
52744 ? 202146494E414C20=1D3
52752 ? 4144445245535320=236
52760 ? 464F522041524541=238
52768 ? 202150524F475241=22C
52776 ? 4D2054495 44C4520=237
52784 ? 284D415820313620=1E5
52792 ? 4348415227532920=219
52800 ? 21124E4F54205541=21B
52808 ? 4C4944922C205452=2A5
52816 ? 5920414741494E20=249
52824 ? 3A20214444953432 0=216
52832 ? 4F52205441504520=26B
52840 ? 2820442F54202920=1E0
52848 ? 3F2100000000000000=0D0
```

A reminder of how to use the Telsoft service.



download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run.

Option 6 for CBM-64

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=&69FF
20 CLS:PRINT
30 INPUT " START ADDRESS (Hex)";A$
40 A=EVAL("&"+A$)
50 IF A>&6F87 THEN 280
60 IF A<&2A00 OR A>&6FE7 THEN 20
70 PRINT ~A" ";
80 INPUT ":" B$,C$
90 IF LEN(B$) <>16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 X$= MID$(B$,2*N+1,1): GOSUB 300
130 IF E=1 THEN 260
140 X$= MID$(B$,2*N+2,1): GOSUB 300
150 IF E=1 THEN 260
160 B= EVAL("&"+MID$(B$,2*N+1,2))
170 ?A=B:A=A+1:T=T+B
180 NEXT
190 FOR M = 1 TO LEN (C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E =1 THEN A=A-1: GOTO 260
220 NEXT
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-8:GOTO 50
260 PRINT "TYPING ERROR !"
270 A=8*(A DIV 8):GOTO 50
280 *SAVE "DOWNLOAD" 6A00 6F87
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<58 THEN RETURN
320 IF ASC(X$)<65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
```

Figure 2. BBC.

```
6A00 :A9C8A0FEA20120F4,4C6
6A08 :FF20616C20486DC9,38A
6A10 :31F000C934F0E9C9,4C8
6A18 :35F0064C0C6A4C47,280
6A20 :6AA90C20E3FFA9E8,482
6A28 :A000A2FF20F4FFA9,4FD
6A30 :03A20020F4FFA902,363
6A38 :A20220F4FFA9C0A0,4C0
6A40 :FEA20020F4FF60A9,48C
6A48 :0C20E3FF20F76BA9,439
6A50 :15A20120F4FFA000,3E8
6A58 :A9FF009985 6FD0FA,587
6A60 :A915A20120F4FF20,394
6A68 :0C6C90F0200C6C80,348
6A70 :F8A000047784 7884,416
6A78 :79847A8478857020,388
6A80 :D56DA57029F0C900,489
6A88 :D0E2200C6C80D099,468
6A90 :7100C8200D56DC009,364
6A98 :D0F0A000A5742900,422
6AA0 :D000A51C057618A5,354
6AA8 :1D6573857720 0C6C,289
6AB0 :800520E3FFC820D5,524
6AB8 :6DC0180 9F0A57320,435
6AC0 :826D200C6C80A0C5,3CC
6AC8 :7AF000A95020E3FF,478
6AD0 :20E7FF4C676A200C,34F
6AD8 :6C800CC578F000A9,48C
6AE0 :5820E3FF20E7FF4C,4AC
6AE8 :676AA573A8898 56F,43E
6AF0 :D00E20E7FFA90820,388
6AF8 :E3FF4C83684C676A,469
6B00 :A000847A8478200C,2C9
6B08 :6C80F2917620D56D,477
6B10 :C8C475D0F1200C6C,45A
6B18 :80E3C57AF000A950,4CE
6B20 :20E3FF20E7FF4C67,488
6B28 :6A200C6C80CFC570,3C1
6B30 :F000A95020E3FF4C,447
6B38 :676A20C76B20E7FF,429
6B40 :A573A8A9009985 6F,3F6
6B48 :A58AC902D0502807,419
6B50 :6BA9C820556CA955,388
6B58 :20306EA95020556C,298
6B60 :A915A20120F4FF20,394
6B68 :F76BA471C0800985,585
6B70 :6FD05198D0F7A90C,4A4
6B78 :20E3FF20A56DA95A,437
6B80 :0582A96F8583A987,387
6B88 :20006E20F86D20A8,208
6B90 :6DA90520006EA900,2DA
6B98 :20E3FF20F86DA9D2,502
6BA0 :20E0FF4C0C6AA955,38F
6BA8 :20306EA99620556C,20E
6BB0 :4C6A6BA475200C6C,2D2
6BB8 :80D0FA200C6C200C,316
6BC0 :6C4C486B4C6C6AA9,336
6BC8 :2020E3FFA96F20E3,43D
6BD0 :FFA96B20E3FF60A9,51E
6BD8 :9CA000A60AE002D0,41E
6BE0 :08A21320F4FFA212,387
6BE8 :20F4FF60A29723F4,4C0
6BF0 :FFA29620F4FF60A9,553
6BF8 :9CA000A60AE002D0,41E
6C00 :EBA25320F4FFA252,4E7
6C08 :20F4FF6010A99685,44F
6C10 :0F847EA991A20020,38D
6C18 :F4FF8009C007D085,448
6C20 :6B684C0C6AA47E20,2D4
6C28 :496CC60FD0023860,374
6C30 :A58AC90200062079,369
6C38 :6E80EC60A991A201,447
6C40 :20F4FF98A47E80DF,55C
6C48 :600AA2D2CAE8CAD0,5AA
6C50 :F8AA60A900047EA0,458
6C58 :20496C80D0FAA47E,449
6C60 :60A9E8A000A2FF20,452
6C68 :F4FFA90085 8AA90C,460
6C70 :20E3FF20A86DA904,3E4
6C78 :20006EA9090582A9,2F0
6C80 :6F0583A00020F86D,39C
6C88 :20156DC941F000C9,370
6C90 :42F011C943F0174C,3A2
6C98 :616CA900A20120F4,335
6CA0 :FF4C876CA900A203,3C4
6CA8 :20F4FF4C876CA900,433
6CB0 :A20420F4FFE60A A5,4CE
6CB8 :7C20E3FFA47E20A0,468
6CC0 :6DA90020006E20F8,2C4
6CC8 :6DA0172015 6DC941,2D0
6CD0 :F00BC942F011C943,413
6CD8 :F0174C616CA907A2,372
6CE0 :0120F4FF4C096DA9,37F
6CE8 :07A20320F4FF4C09,314
6CF0 :6DA907A20420F4FF,3D6
6CF8 :E68AA58AC90?D009,443
6D00 :A9E8A000A20120F4,3E0
6D08 :FFA57C20E3FF2053,495
6D10 :6C20536C60204B6D,2E3
6D18 :A9052000 6E20F86D,2C1
6D20 :20A86DA90520006E,274
6D28 :20F86D20A86DA905,368
6D30 :20006E20F86D20A8,2DE
6D38 :6D847EA90320006E,2A9
6D40 :A9D220E0FF857C60,4D8
6D48 :A90C20E3FF20A86D,3EF
6D50 :A90720006EA99A85,306
6D58 :82A96E8583A00020,361
6D60 :F86D20A86D20996D,3C0
6D68 :20996D20996D20A8,317
6D70 :6DA90A20006E20F8,2C6
6D78 :6D20A86DA9022000,270
6D80 :6E20F86D20A86D20,348
6D88 :E7FFA9D220E0FF48,5A8
6D90 :A90FA20020F4FF68,3D5
6D98 :60A90020006E20F8,287
6DA0 :6D20A86D6020A86D,33A
6DA8 :20A86D20E7FF20E7,445
6DB0 :FF60480 29F06A6A6A,3FE
6DB8 :6A0930C93A300318,1F1
6DC0 :690720E3FF60290F,312
6DC8 :0930C93A30031869,1F0
6DD0 :0720E3FF60457885,3AE
6DD8 :78A208A57B2A900C,388
6DE0 :A57849088578A57A,398
6DE8 :4910857A267A2678,299
6DF0 :CAD0E86020E3FFC8,5AC
6DF8 :B182C900D0F6C860,4F7
6E00 :867DAAA92020E3FF,478
6E08 :CAD0FAA67D60C97F,55F
6E10 :D000A98620F4FFE8,4FD
6E18 :00F012A97FC92080,3C3
6E20 :0EC900F00AC90DF0,3A1
6E28 :06C907F002A90060,2D1
6E30 :857C867D847EA991,440
6E38 :A20120F4FFA903A2,404
6E40 :0720F4FFA996A200,403
6E48 :20F4FF902902F0F4,48A
6E50 :A47CA997A20920F4,41F
6E58 :FFA903A20420F4FF,464
6E60 :A991A20020F4FF80,49F
6E68 :09C0070005686 84C,2C1
6E70 :0C6AA57CA67DA47E,3DC
6E78 :60847E867DA996A2,446
6E80 :0820F4FF982901F0,3CD
6E88 :08A996A20920F4FF,408
6E90 :90189001 38A67DA4,348
6E98 :7E60444F574E4C4F,281
6EA0 :414449 4E4720 4D45,215
6EA8 :4E5580312020 2052,193
6EB0 :4543454956450D34,1F2
6EB8 :2020205345542042,1AE
6EC0 :6175642052617465,2E6
6EC8 :0035202020455049,188
6ED0 :5420544F20424153,280
6ED8 :494300454E544552,217
6EE0 :204E554D4245520D,1F6
6EE8 :2020555345204354,1EC
6EF0 :524C2047205 44F20,1F5
6EF8 :52455455524E2054,254
6F00 :4F204D454E552029,1ED
6F08 :0D5345542054524 1,208
6F10 :4E534D4954204261,24E
6F18 :756420526174650D,292
6F20 :4120202037352042,16F
6F28 :617564 0D42202033,1FC
6F30 :3030204261756 40D,209
6F38 :4320313230302042,188
6F40 :617564 0D53455420,253
6F48 :5245434549564520,223
6F50 :4261756420526174,2C3
6F58 :650D50524F475241,23D
6F60 :4D20204C4F414445,1F2
6F68 :4420206F6B0D5052,20D
6F70 :455353204 14E5920,213
6F78 :4B4559204 64F5220,218
6F80 :4D454E550D202020,1A2
```

Figure 1. Spectrum.

```
5 REM SPECTRUM 48k                fig 1
10 REM Hex Code Loader
15 CLEAR 59000
20 POKE 23658,8: CLS : PRINT
30 INPUT "Start Address ";a
50 IF a>61135 THEN GO TO 280
60 IF a<60000 THEN GO TO 20
70 PRINT a;
80 INPUT " :";b$
85 IF B$="END" THEN GO TO 280
90 IF LEN b$<>20 THEN GO TO 260
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+1)
125 GO SUB 300: LET y=x
130 IF e=1 THEN GO TO 260
140 LET x$=b$(2*n+2 TO 2*n+2)
145 GO SUB 300: LET y=y*16+x
150 IF e=1 THEN GO TO 260
170 POKE a,y: LET a=a+1
180 LET t=t+y: NEXT n: LET y=0
190 FOR m=1 TO 3
200 LET x$=b$(17+m TO 17+m)
205 GO SUB 300: LET y=y*16+x
210 IF e=1 THEN LET a=a-1: GO TO 260
220 NEXT m
230 IF t=y THEN PRINT ":";b$: GO TO 50
240 PRINT "Checksum Error"
250 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=8*INT (a/8): GO TO 50
280 SAVE "download"CODE 60000,1136
290 POKE 23658,0: STOP
300 LET e=0: LET x=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN LET e=1
320 RETURN
```

Figure 2. Spectrum.

```
60000 :CD15EDC307ECCD15,4C7
60008 :EDCD36ECCD66EDCD,631
60016 :30EDCD47EE30F8CD,5AF
60024 :88EDFE31CA99EAFE,69A
60032 :35CA07EAC366EACD,5D0
60040 :15ED3EFACD84EDCD,5FD
60048 :15EDC9CD15EDC366,553
60056 :EACD66ED11E5EE06,58C
60064 :003EFF121310FCCD,458
60072 :15EE11CDEE06173E,3D2
60080 :2012131 0FCCD1FED,3DA
60088 :30F0CD50EDCD1FED,588
60096 :38F03265EF3E0032,3E9
60104 :6CEF326FEF3270EF,544
60112 :3A65EFCDEBEC3A65,5A1
60120 :EFE6F0FE0020DE0E,627
60128 :091165EFCD1FEDDA,501
60136 :AAEA1312CDEBEC0D,552
60144 :20F23A69EFE68020,51A
60152 :00214B5C3A68EF0E,36C
60160 :0047092268EF0E00,1D4
60168 :11CDEECD1FED389A,47F
60176 :12130CCDEBEC79FE,45C
60184 :1020F03A68EFCD81,447
60192 :ECCD1FEDDAAAEA21,574
60200 :6FEFBE28133E5811,326
60208 :E0EE12133E0012CD,348
60216 :D7ECCDA6ECC3AAEA,681
60224 :CD1FEDDAAAEA2170,518
60232 :EF8E20EE121E5EE3A,524
60240 :68EF856F3E000C67,3CC
60248 :3E008E2008CDD7EC,40F
60256 :3E2132005CC3FFE8,482
60264 :3E00326FEF3270EF,3C7
60272 :ED5B68EF0E00CD1F,40C
60280 :EDDAAAEA3273EFCD,634
60288 :EBEC3A68EFFE0020,306
60296 :053A69EFE6803A73,432
60304 :EF12130C3A6AEF89,3FC
60312 :280CCD1FEDDAAAEA,5D8
60320 :216FEF8EC22DE0CD,584
60328 :1FEDDAAAEA2170EF,5A2
60336 :8EC22DE83E6F32E2,589
60344 :EE3E6832E3EE3E00,490
60352 :32E4EE3A085CFE21,501
60360 :2003CD15EECDD7EC,553
60368 :CDA6EC21E5EE3A68,5C5
60376 :EF856F3E008C6736,422
60384 :0021E3EEED4B66EF,561
60392 :0C7EFE00C28DEA23,4FC
60400 :0D20F63EFACD84ED,589
60408 :3E01D3FEC366EACD,5E8
60416 :1FED30F8C38DEAF3,594
60424 :0603AFD3FF10F83E,3D8
60432 :4803FF3EFFD3FF3E,56F
60440 :31D3FF3E0F320F5C,385
60448 :32805C32485C3E01,250
60456 :03FE21915CC89EF8,368
60464 :CD50EDC366EACD15,52F
60472 :EECD66ED3E01D3FE,556
60480 :2165EE3E00CD0FEC,442
60488 :CD84ECCDA3ECCDA6,654
60496 :EC23CD77ECCD77EC,58F
60504 :CDA0ECCD84ECCDA6,661
60512 :EC233E0DCD0FECCD,4CF
60520 :84EC23CDA3EC3E03,498
60528 :CD0FECCD84ECC9CD,688
60536 :A3EC3E07CD0FECCD,561
60544 :84EC23C97EFE00C8,520
60552 :CD8BED23C384ECFE,651
60560 :00C8F53E20CD8BED,520
60568 :F13DC38FECCDA0EC,65D
60576 :CDA3ECCDA6EC3E0D,5A6
60584 :CD8BED3EFF320C5C,574
60592 :C9F513E6F0CB1FCB,60C
60600 :1FCB1FCB1FF630FE,4CF
60608 :3AFAC6ECC6071213,498
60616 :F1E60FF630FE3AFA,606
60624 :D4ECC6071213C921,46C
60632 :CDEEE5CD84ECE106,69C
60640 :173E207723 10FC3E,339
60648 :0077C9E52170EFAE,538
60656 :77C50E807EA7CB17,449
60664 :3080 7EEE08773A6F,3C9
60672 :EFEE10326FEF3721,3D5
60680 :6FEFCB1623CB160D,358
60688 :20E2C1E1C9110501,394
60696 :216A80CD8503C93E,32F
60704 :963277EFCD47EDDA,529
60712 :2EEDF1C366EACDAC,5C8
60720 :ED78E601F602D3FE,548
60728 :AF2177EF35200237,2FC
60736 :C9CD77ED30EBC9CD,5F0
60744 :47EED0FECBC037C9,5E6
60752 :F5D0FF3A81EFFE00,5C7
60760 :20043E3610023E37,187
60768 :D3FFDB7FF1C9F53A,675
60776 :81EFFE0028043E36,376
60784 :D3FFCD50EDF1C93E,644
60792 :00DBFFE60037C8D8,59.
60800 :FFE60237C8DBFFE6,626
60808 :302004DB7FA7C93A,3E8
60816 :81EFFE0020043E37,397
60824 :10023E36D3FFDB7F,452
60832 :C9CD47ED3A73EFD8,5DE
60840 :F1C366EAF53ED23D,5EE
60848 :20FDF1C9CDACED3D,62A
60856 :20FAC9C5D5E5F5FE,78D
60864 :7F2813CDF9EDFE0C,537
60872 :280CFE0D20053E20,28A
60880 :D73E0DD7181 03E20,34F
60888 :D73E08D73A085CFE,4E8
60896 :2120033E08D73E5F,2E6
60904 :D73E08D7F1E1D1C1,640
60912 :C9FE07281CFEC820,4F3
60920 :19FE0C2814FE0820,388
60928 :10FE08280CFE20FA,367
60936 :0FEEFE08FA11EE3E,4BA
60944 :00C93E07C9CD6808,32C
60952 :3E02CD01163E1832,1C4
60960 :095CC93E121601CD,382
60968 :1122C93E121600CD,257
60976 :1122C9C5D5E53E02,3E8
60984 :CD0116CD47EE30F8,451
60992 :CD5CEEE1D1C1C93A,5CD
61000 :385CC86F200C3A08,20F
61008 :5CF5213B5CCBAEF1,4C3
61016 :A7C937C9F5111000,3DE
61024 :CD18EDF1C9444F57,4D6
61032 :4E4C4F41444 94E47,284
61040 :204D454E55003120,216
61048 :2020524543454956,276
61056 :4500352020204570,217
61064 :6974207 46F204261,328
61072 :7369630020205573,20F
61080 :652053796D626F6C,393
61088 :2053686966742020,388
61096 :204700746F205265,2C9
61104 :7475726E20746F20,39C
61112 :4D454E5520290045,278
61120 :4E544552204E5540,389
61128 :4245522000000000,1C1
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BLUFFERS' GUIDE TO MICROS

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Software packages seem stuck with a credibility gap. Not the same gap a between (a) the number of free hard-disk PCs which your MP promises each voter, and (b) the number you suspect will actually turn up. I'm thinking of a fixed law of nature — like the Special Theory of Relativity, which states that even the zippiest "turbo loader" can never reach the speed of light.

Similarly, the awesome Lanford Theory of Crdibility Gaps explains that no software package ever reaches total credibility. As with Einstein's theory, the problem is that as you accelerate towards the speed of credibility, the total mass of updates and extra documentation approaches infinity....

This is such a revolutionary theory that I'll spare you its shattering implications. Let's start by looking at the factors of the equation which gives us the Credibility Gap, CG, measured in the standard units of kiloboggles.

The first term is X, which stands for the lag between software and documentation. It's like this. When a programmer reluctantly fixes bugs in his major business software "Manic Space Goat Attack", he's likely to include new bright ideas. For example: a special control key which you touch when your boss sneaks into the office, and which instantly clears all sprites, goats, and lurid graphics from the screen, relacking them with an obviously boring and worthy spreadsheet. (This one could be worth its weight in gold, and I'm copyrighting it.)

Unfortunately, fifteen thousand manuals describing the intricacies of "Manic Space Goat Attack" have already been printed. No way are they going to be thrown away and a new lot run off! The brand-new feature stays mysteriously undocumented...though in disk software you'll sometimes find an furtive extra file called READ.ME, full of outrageous claims about updates.

Our second variable, Y, stands for the lage between documentation and software. This is not the same as X. Here, cackling evilly, we can take an example from real life. The ultra-popular Amstrad PCW8256 comes with a word processor (Locoscript), and a manual explaining how to insert automatic page numbering. In Locoscript 1.0, still being sold, this has a slight bug: you press the indicated keys and, almost immediately...nothing happens. The software hasn't yet reached the level described in the instructions!

(Lumbered with Locoscript 1.0? Note that version 1.2, which corrects the bug and adds other improvements, can usually be got by sending a grovelling letter to Amsoft.)

What shall we call the third viariable? Just to be different: Z, the lag between software and (to use a posh word) its environment. Remember all those clever programs using odd bits of "reserved" memory — programs which went bananas when you plugged in the new peripheral or transferred them to a newer version of the same computer?

This doesn't just happen with Spectrums. The huge US outfit Ashoton-Tate got egg all over its face with dBase II. This database made use of memory locations reserved for the MS-DOS operating system, which was fine until the latest version of MS-DOS arrived from MicroSoft...and all of a sudden, the most popular database in the world wouldn't save files to disk. I felt deeply sympathetic, behind the outward sniggers.

You can guess the Law now. It goes:

CG=X+Y+Z

CG > 0

In other words, one or more of these lags is always present. The proof is, er, left as an exercise for the student. Anyone thinking they're able to disprove the theory will be treated with the same gentle sympathy reserved for those who write graphics programs to generate four-sided triangles.

David Longford.

PASCAL

Everywhere you look these days there seem to be articles slamming Basic, but rarely do you see a word written against Pascal. So what is this marvellous language that somehow manages to avoid all the faults Basic is plagued with? What can it do, and how easy is it to learn?

The first thing you are likely to notice when you look at a Pascal program is that it has a clear structure. First comes the program header, followed by the variable delcarations, then the subroutine declarations, then finally the main program block. This structure is compulsory; in Pascal you cannot produce the sort of higgledy-piggledy mess that so often passes as a Basic program. The listing is usually indented so that individual routines stand out clearly, making even long programs remarkably easy to read.

Structuring makes for disciplined programming; it forces you to stop and think what you want to do, what variables and subroutines you will need and so on before you start writing. The extra planning time which is needed is likely to be more than compensated for by a reduction in debugging time when the program is finished, as a lot of the errors which can arise when writing an unstructured program will be avoided during the planning process. For example, drawing up a list of variables at the beginning will ensure that you cannot use the same name for two different variables.

A closer examination of a Pascal program will reveal that many of the commands are almost identical to those used in Basic. Compared with other high-level languages such as Forth and

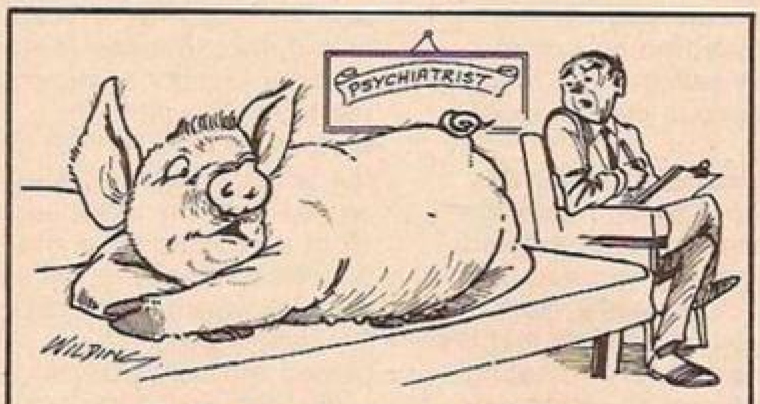
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PASCAL

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Logo, it looks comfortingly familiar. There are some new commands and techniques to learn, of course, but the fact that you can still use IF . . THENs and FOR . . NEXT loops gives you a definite head-start in the learning process.

But why bother to learn Pascal at all if it is so like Basic? Wouldn't it be easier to just learn how to structure your Basic programs properly? Well, no, because there is one very important difference between the two languages; Pascal is compiled, whereas Basic is interpreted. All high-level languages are foreign languages to a computer, which only understands its own machine-code. The Pascal compiler translates your Pascal programs into machine-code, while the Basic interpreter merely provides a sort of dictionary containing translations of individual commands. Just as you would be able to read an English translation of a foreign book much more quickly than you could read the original version by looking up the meaning of each word in a dictionary, so the computer can run a compiled Pascal program much faster than an interpreted Basic one. You can achieve almost the same results as if you were writing in machine-code, but with much less effort.



'So You think You are fifth Generation Language?'

What you can actually do with Pascal will depend on which version you have. There are lots of packages on the market, for all the popular micros. There are considerable variations in price, and the most expensive are not necessarily the best. All of them should support text handling and all the standard arithmetic commands, but some have much better ranges of graphics and sound commands than others, and these commands are obviously very important, particularly if you are interested in writing games. Some are also much closer to standard Pascal than others, and this is obviously an advantage if you want to be able to make use of printed listings as well as writing your own programme. Oxford Computer Systems do a good version for the B.B.C., Commodore 64 and Spectrum, but take a look at the Acornsoft version for the B.B.C. and First Publishing's pascal 64 for the Commodore as well. HiSoft's pascal Compilers have also won good reviews all round.

Margaret Norman

I Could Do That

Games programming is a very special skill. In no other area does the programmer have to expend as much effort on making his code as efficient and as compact as possible. If you are writing a business program for a 16-bit machine, you've probably got plenty of Ram to play with, and your speed will only be a secondary consideration. By contrast, to write a good game on an 8-bit micro the programmer needs to ensure that every byte is profitably employed and, of course, speed is crucial. On top of this, as a games programmer you will probably be working with a relatively crude processor, so you need to discover how it can be exploited to the fullest.

Games programming is indeed the greatest challenge of all. When you consider that Jeff Minter managed to cram the first version of Gridrunner into 3.5K on the Vic-20, you have to scratch your head in amazement.

On a smaller scale, the entries to our arcade classics competition have also worked miracles of compression. In November we asked you to write a version of Breakout in less than 20 Basic lines. The £15 prize goes to W. Jones, 24 Underhill Crescent, Abergavenny, Gwent, who shows here how to do it on a Dragon. His program manages to include sound, scoring and instructions in just 19 lines.

```
 1 CLS:PRINT@44,"breakout";:PRINT@128," MOVE THE BAT AT THE BOTTOM OF   THE SCRE
EN, BY USING THE LEFT   AND RIGHT ARROW KEYS, TO MAKE   THE BALL BREAKOUT THROUG
H THE   FOUR COLOURED ROWS.":FORDE=1 TO 3000:NEXTDE
2 CLS0:BA$=CHR$(148)+CHR$(156)+CHR$(152):BA=1:PRINT">breakout  BALL= 1  SCORE= 0
0   ";:GOTO5
3 KB=M-((PEEK(344)=223)AND M<478)+((PEEK(343)=223)AND M>449)
4 PRINT@M-1,STRING$(3,128);:M=KB:PRINT@M-1,BA$;:RETURN
5 FORA=31 TO 415 STEP32:PRINT@A,"<>";:NEXT:PRINT@416,STRING$(32,128);:M=464
6 FORA=0 TO 3:FORB=1 TO 30:PRINT@(A*32+64)+B,CHR$(191+16*A);:NEXTB,A
7 W=2:X=RND(3)+30:Y=15:IF HI=1200 OR BA>20 THEN 19
8 Z=RND(3)-2:IF Z=0 THEN 8
9 GOSUB3
10 SET(X,Y,3):GOSUB3
11 XM=X+Z:IFXM<2 OR XM>61 THEN Z=-Z:XM=X+Z+Z:SOUND200,1
12 GOSUB3
13 YM=Y+W:IFYM<2 THEN W=1:YM=Y+W+W:SOUND200,1
14 IFYM>31 THEN RESET(X,Y):SOUND10,4:BA=BA+1:PRINT@16,BA;:GOTO7
15 IF POINT(X,Y+1)=2 THEN SOUND 150,1:W=-2:XM=X:YM=Y+W:GOTO17
16 IF POINT(X+Z,Y+1)=2 THEN SOUND 150,1:W=-2:Z=-Z:XM=X+Z:YM=Y+W
17 IF POINT(XM,YM)>3 THEN SOUND 255,1:HI=HI+10:PRINT@INT(XM/2)+32*INT(YM/2),CHR$
(128);:W=-W:XM=X:YM=Y:PRINT@26,HI;:GOTO17
18 RESET(X,Y):X=XM:Y=YM:GOTO10
19 CLS4:PRINT@96,"YOU HAVE USED YOUR 20 BALLS YOURSCORE WAS ";HI:PRINT@320,"MAXI
MUM SCORE POSSIBLE IS  1200
```

RESPONSE FRAME

Do you have a problem related to your micro? Our team will do their best to help. Please include only one question per letter and mark it "Response Frame". Alternatively, perhaps you have an idea you have an idea you'd like to pass on to others. Why not write to us with your top tips?

AMSTRAD MACHINE CODE

● **I am a competent Basic programmer, and now want to program my Amstrad in machine code. Can you advise me how to approach the task?**
David Browne,
Clifton,
Bristol.

This question crops up over and over again. Probably, because people feel learning machine code is particularly difficult. No-one, after all, would ask the same question about learning Basic. If they did, the best answer would be: just dive in. And that is what most people do.

My advice on machine code is exactly the same. Low level languages are not much trickier than Basic. You simply have to be more painstaking and more meticulous. Get hold of a good assembler — my own preference on the Amstrad is for the Devpac assembler — buy a book on Z80 machine code, and have a go.

To be more specific, buy a book that is geared to the Amstrad. Beginners are commonly recommended Rodney Zak's Programming the Z80, the definitive work on this processor. But in my experience this is far too general. Ian Sinclair's Introducing Amstrad CPC464 Machine Code, published by Granada, is a better buy for the complete novice, although it only takes you so far.

Half the problem when you are starting out is finding your way around your machine; in other words, knowing where to store your code, how to incorporate it in Basic programs, how to write to the screen, and so on. All these problems are specific to your computer.

For this reason you will also need to buy the Complete Amstrad Firmware Manual which gives details of all the ROM routines and their jump blocks in RAM. It is expensive but invaluable. Without the Firmware Manual you would have to spend a lot of time duplicating routines that already exist. For example, why write a program to draw lines when there is a line draw routine already in the ROM?
Jim Taylor.

SMOOTH SCROLLING

● **How do I achieve smooth sideways scrolling onthe CBM-64. Can it be done from Basic?**
Sean Hardman,
Roadwater,
Somerset.

Smooth scrolling can indeed be done from Basic — but only up to one character space. The CBM-64's VIC chip has two registers — 53265 and 53270 — which allow the display to be shifted a pixel at a time. The following program scrolls text from left to right:

```
10 FOR N=1 TO 40:PRINT
   "A";:NEXT
20 FOR X=0 TO 7
30 POKE 53270, (PEEK(53270)
   AND 248)+X
40 NEXT
```

Note that as the display moves right it leaves a space at the left. If the size of the display is reduced to 38 columns, new data can be printed so that it scrolls into view from the left. Combining this technique with a machine code routine to shift the entire screen by one character creates a continuous smooth scrolling effect.

POKE 53270, PEEK (53270) AND 247 shrinks the screen to 38 columns, blanking out the columns at the sides. For a fuller explanation of the techniques see Nalin Sharma's article in Your Computer, October 1985.
Jim Taylor.

SECOND OPINION

May I give my comments on the response headed Pseudo Bleep in the November issue? The answer to the first part — how to simulate BEEP in machine code — was partly correct: the routine is at 03B5H and DE should hold the length multiplied by the frequency. However HL does not hold the frequency, it holds a function thereof, calculated by HL=437500/F −30, where F is the frequency in Hertz. This can in turn be calculated by F=261.6*2↑(B/12) where B is the beep number. (these should obviously be calculated before writing the program).

The answer to the second part — how to make the sound louder — is wrong, as is the phrase "some programs manage to make the music play far louder than normal" in the question. Unless programs are named, I am afraid I must disagree with this. The loudspeaker is in a circuit which can feed it with logic 1s and 0s and nothing else. Therefore the amplitude with which it vibrates is fixed (unless the frequency is so high that the speaker cannot cope) and therefore maximum volume is heard when it is vibrated with an equal mark/space ratio at audible frequencies, which is exactly what happens in BEEP. All that a program can do, other than altering the quality of the sound, is make the volume less. However there is hardware which can amplify BEEPs, including the tape recorder you play tapes into the computer with, if it has an internal speaker. Connect a cassette lead between the MIC sockets of computer and tape recorder, leaving the tape EAR socket unconnected, eject any tape and press PLAY.

As for the two channel routine which was supposed to give us extra volume, it did not even give two channels. In fact, it gave an ordinary beep, interrupted with a click at regular intervals.

A two channel routine which works — like the one in Fairlight, for example — is possible, but is fairly complicated, and is also probably supposed to be a secret. *Ian Collier.*

COMPETITION RESULTS

GOONIES

November's Goonies competition offered some of the most enticing prizes ever. For the winner, a £400 Philips CD-150 compact disc musice system, plus Cynci Lauper's Goonies Soundtrack. For the runners-up there were 25 treasure chests crammed with doubloons, two Goonies film tickets, and a copy of Datasoft's Goonies game.

We asked you to come up with a film or a book you though woul make a good computer game. Some of the titles suggested were bizarre, to say the least. No-one put forward the Bible, but we did have the game of the QL manual, the game of Guns of Navarone — "You control David Niven" — and Miss Cayley's Adventures, published in the Strand Magazine in 1898.

The trouble with these books and films is that it is difficult to imagine how they could ever be translated into keyboard action. A much more practical suggestion for a game conversion was Mad Max III. The Thunderdome sequence, in particular, would make a cracking good combat game.

As no less than 20 entries came up with this idea we decided to leave the winne to chance. The first price goes to the first Mad Max nominator picked from the hat — Nick Moore, Cherry Trees, Swannaton Road, Dartmouth, Devon, TQ6 9RL.

Runners-up prizes to: J. Avern, Shalford; S. Green, Stapleford; D. Cook, Balham; D. Parish, West Wickham; J. Elliot, Sevenoaks; P. Maddison, Lewisham; R. Drukker, Amsterdam; C. Broad, Oldham; P. Williams, Newbury; J. O'Connor; J. Ohanen, Findland; M. Groll, Brereton; D. Hubbard, Northwith; P. Ingram, Merseyside; G. Yates, Chorley; D. Perryman, Faversham; M. Camp, Sudbury; R. Hardstaff, Notts; I. Anderson, Leicester; G. Denne, London; J. Salter, Seaford; S. Ratko, Yugoslavia; G. Burge, Glasgow; D. Jordan, Pontefract; C. Wall, Maidstone.

TRANSFORMERS

Last but not least come the Slags. These went to Carl Pollard from Newport, Shropshire for transforming a C16 into a trash can. Farukh Adia from Stoke, Newington transformed his Commodore into a Rambot, subtitled More chips part II. Ian Madden from Derby, under parental pressure wants to transform his Commodore into an Automatic bedroom cleaner, and Dennis Richards from London invented the Spectorbot, designed with Commodore bashing in mind.

Winners of the 50 Commodore games were: D. Owen, M. Sexton, P. Bromley, C. Tham, W. Sowden, D. Caley, M. Dickinson, R. Corremans, M. Dahl, G. Weller, T. Asphaug, P. Bennett, I. Khan, M. Bailey, S. Hiles, J. Clare, M. Slater, P. Allen, M. Tallqvist, E. Dickson, M. Bolli, C. Lockhorst, G. Hitchcock, J. Weller, R. Gill, A. Lincoln, N. Tovey, R. Hull, T. Beveridge, P. Calvert, J. Vibert, A. Sienkiewicz, N. Ganger, A. Schmidt, A. Mansour, M. Poynter, J. Gillespie, R. Schuchardt, A. Pickington, L. Smyth, S. Rutherford, C. Platt, G. Balfour, P. Clarkson, J. Fisher, M. Teglbaerg, N. Gibbins, L. Fai Lee, M. Ratcliffe, G. Henderson, S. Evans.

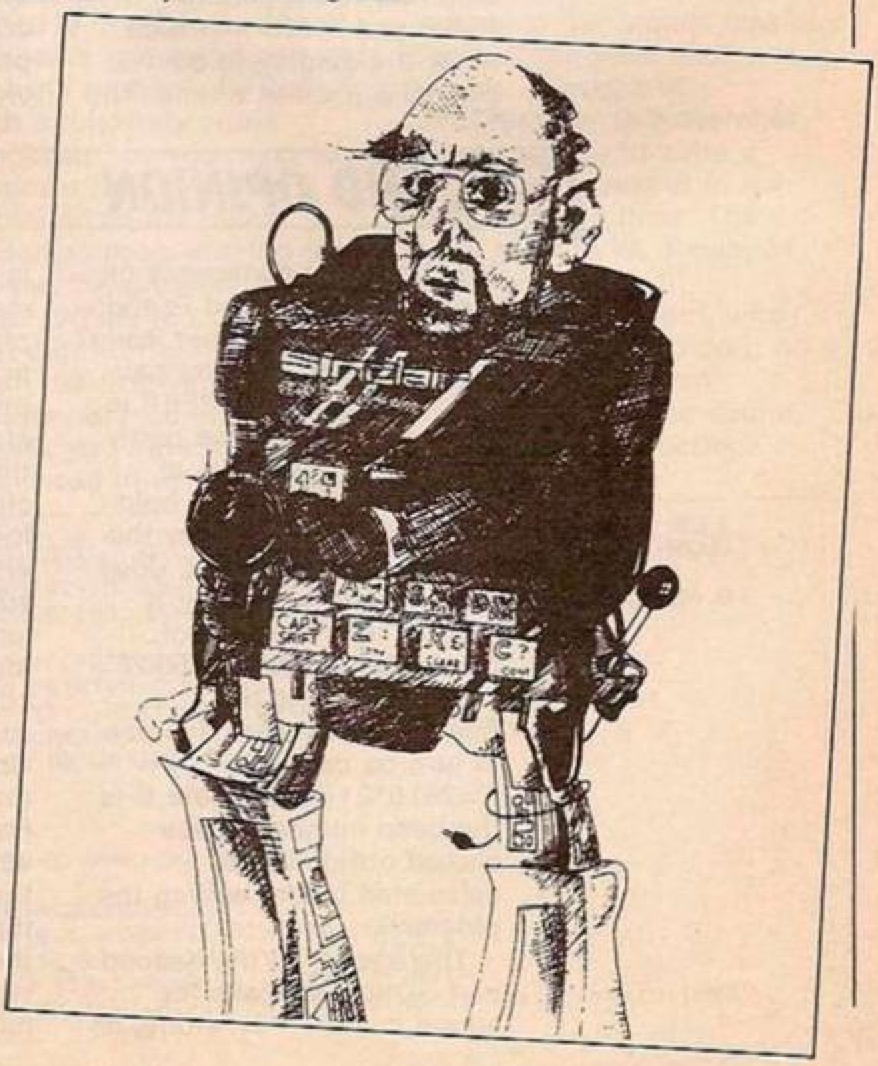
Winners of the 50 Spectrum games were: S. Priestley, M. Dale, J. Burton, A. Jones, C. Morling, A. Fraid, A. Barlow, L. Chapman, A. Stevenson, P. Stevenson, J. Roberts, J. Lorkin, A. Stamp, M. Warlow, S. Cutts, G. Pittendrigh, A. Brand, R. Newton, D. Cook, M. Bill, N. Leveridge, S. Broster, I. McKay, S. Fell, D. Spencer, S. Balls, M. Jones, M. Davies, J. Somerville, C. Ash, N. Owens, C. Rosenquist, M. Akin, R. Sherry, S. Knight, C. Hockney, M. Orton, R. Kenn, D. Sellars, S. Barrett, M. Sims, N. Pavis, S. McGibbon, B. Warren, O. Aysha, D. Grauskov, D. Taylor, W. Whitehouse, H. Thompson, E. Ashford, L. Herrett, N. Dickson, K. Hung Man.

What would you like to see your computer Transform into? That was the bizarre question we posed in our December competition. Many obviously drew inspiration from the T.V. series and had their computers taking various aggressive forms suitable for dealing with Deceptions and their ilk. Joysticks turned into lasers, disc and microdrives into deadly projectile weapons and grenade launchers.

Winner of the Grimlocks Dinobot was Bjorn Jeffery from Goteborg, Sweden. He made rather a meal of it and Transformed his Spectrum into a plate of fish and chips. Another winner was Richard Higson of West Clevelys, Lancashire. He had "Your Computer" magazine turning into a C5. He didn't express an opinion on which was the more valuable, but suggested the C5 might come in handy round the office. Miss Bond from Stockport Transformed her Spectrum into a Chip Butty, and A. Williams sent in this picture of a well known computer manufacturer "more machine than man".

Among the Snarls winners was Stephen Martin from Palmers Green, London. He illustrated a process whereby a Spectrum might be transformed into a Commodore, tactfully, he did not state if he considered this an improvement. Andrew Carson-Rowland from Hickley Leicestershire suggests that an overheating Spectrum transforms itself into a useless blob of melted plastic. Anders Nilson from Habo in Sweden thought his Computer might transform into "Your Computer", but would of course still be his. He must have willed away many a long winter's evening chuckling about that one. M J Fletcher from Maidenhead, Berks produced a Robodrag, being the only use he could now think of for his Dragon 32.

On to the Sludges now. Mark Middleton from Burton upon Trent has rumbled Sir Clive, and has him busy transforming dead Spectrum's into QL's by the use of musclepower and Tippex. Robin McKie from Ayshire suggested that Sir Clive should get his Spectrum to transform into a computerised boxing glove next time he goes near any Cambridge pubs. Mr. N. T. Hunt has invented the computerised hedgehog. Unlike its biodegradable counterpart, this animal is RAM proofed, crash resistant. Given the write procedure, it can plot its run, avoiding the buses and safely collect its bits then return to its nest and store them for a few bytes so it can goto sleep for winter. Darren Sutherland from Palmers Green transformed his Spectrum into Ghettoblaster.



Software File

DOWNLOAD

♦Spectrum ● IG Bradbury ● Watford

This program allows readers with a 48K Spectrum and Inferface 1 to take advantage of the Telsoft downloading service offered by this magazine without the need to purchase a special modem containing special firm ware. The only hardware that is required is a simple 300bps modem connected to Interface 1's RS232 communications port.

Programs for Software File should be fairly compact and sent on a cassette. Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted to *Your Computer* exclusively.

First type in the Basic bootstrap program in listing 1. This should then be saved on your microdrive by doing a Run 9010.

The next step is to type in the hex loader program which will be used to enter the machine code at 64000 which is the heart of the download program. This hex loader program can be found in listing 2 and is similar to the hex loader program used to enter the Telsoft program in December's issue of this magazine. Once this has been entered save it for safety on microdrive by issuing the immediate Basic command RUN 9020.

Now for the tedious bit; using the hex loader program, enter the machine code for the "download" segment by typing in the hext data contained in listing 3. When this has been completed the program will automatically save and verify the machine code on your Microdrive.

Ensure your moden is connected to your telephone, powered up and also connected to the RS232 port on interface 1. Do not dial the 300bps Telsoft service yet. Next load the "download" Basic program which will automatically load the machine code segment "download" into memory at 64000. A screen of information will be presented reminding you that two downloads are necessary — more about the reason for this later.

The first pass should be

Listing 1.

```
 10 REM "download" prog 26Nov85
 50 CLEAR 63999
 100 PRINT AT 10.10: INVERSE 1:"
NOW LOADING": INVERSE 0
 110 PRINT AT 12.4:"download0 CO
DE 64000.*"
 150 LOAD *"m".1."download0"CODE
 64000
 200 CLS : PRINT AT 0.10:"Loaded
 OK"
 250 PRINT AT 2.0:"This program
reads programs in"
 251 PRINT "Telsoft format via I
nterface1's"
 252 PRINT "communications port
at 300 bps."
 270 PRINT AT 6.0:"Only transmis
sion blocks with"
 271 PRINT "good header and data
 CRC's are"
 272 PRINT "accepted.":AT 10.0:"
Two passes are necessary."
 280 PRINT "Load and save BASIC
segments"
 281 PRINT AT 12.0:"first and th
en CODE segments."
 290 PRINT AT 14.0:"If necessary
 select the display"
 291 PRINT "option to obtain the
 programs"
 292 PRINT "memory map for BASIC
 and CODE"."segments."
 400 PAUSE 200: PRINT AT 0.0:
 410 PRINT  FLASH 1:" Press a ke
y to enter m/c code": FLASH 0
 450 PAUSE 0: CLS : RANDOMIZE US
R 64000: STOP
9000 REM Save program on MD
9005 ERASE "m".1."download"
9010 SAVE *"m".1."download" LINE
 10
9020 VERIFY *"m".1."download"
9030 STOP
9040 SAVE *"m".1."download0"CODE
 64000.1416
9050 VERIFY *"m".1."download0"CO
DE 64000.1416
```

Listing 2.

```
10 REM HEX CODE LOADER 27Nov85
20 CLEAR 63999: POKE 23658,8: CLS : PRINT
30 INPUT "Start address ";a
50 IF a>65415 THEN  GO TO 280
60 IF a<64000 THEN  GO TO 20
70 PRINT a;
80 INPUT " :";b$
85 IF b$="END" THEN  GO TO 280
90 IF LEN b$<>20 THEN  GO TO 260
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+1)
125 GO SUB 300: LET y=x
130 IF e=1 THEN  GO TO 260
140 LET x$=b$(2*n+2 TO 2*n+2)
145 GO SUB 300: LET y=y*16+x
150 IF e=1 THEN  GO TO 260
170 POKE a,y: LET a=a+1
180 LET t=t+y
185 NEXT n
189 REM Verify checksum
190 LET y=0
195 FOR m=1 TO 3
200 LET x$=b$(17+m TO 17+m)
205 GO SUB 300: LET y=y*16+x
210 IF e=1 THEN  LET a=a-1: GO TO 260
220 NEXT m
230 IF t=y THEN  PRINT ":";b$: GO TO 50
235 REM Error handling code
240 PRINT "Checksum Error"
250 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=8*INT (a/8): GO TO 50
280 REM SAVE download0 on MD
283 LET f$="download0": LET s=64000: LET l=1416
284 PRINT '"PRESS ANY KEY TO SAVE CODE"'': PAUSE 0
285 PRINT "saving ";f$;" CODE ";s;",";l
286 SAVE *"m",1,f$CODE s,l
287 PRINT "verifying ";f$: VERIFY *"m",1,f$CODE s,l
290 POKE 23658,0: STOP
295 REM Sub: Hex to numeric
300 LET e=0: LET x=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN  LET e=1
320 RETURN
9000 REM SAVE THIS LOADER ON MD
9010 ERASE "m",1,"hexloader"
9020 SAVE *"m",1,"hexloader" LINE 10
9030 VERIFY *"m",1,"hexloader"
```

Listing 3.

```
64000 :31FFFFCD76FCCDC9,604
64008 :FCCDEBFCCDA8FCCD,6F6
64016 :27FCCDD6FA20F8CD,5B5
64024 :59FBCD93FBCD27FC,5B7
64032 :3AA5FD47CD47FC28,47B
64040 :F40602CD47FC28ED,449
64048 :CDC9FAC43DFB20E5,5C1
64056 :CDD6FAC43DFB20DD,5CE
64064 :CDEFFACD10FBCD71,60C
64072 :FACDEOFA3AA3FD4F,612
64080 :CDAOFBCDBAFB20C5,61F
64088 :CDB4FACD5FFAC92A,5EC
64096 :B25C363E2B3600F9,33C
64104 :210313E5223D5CFB,33A
64112 :C92146FFCB4EC821,4A1
64120 :A4FDCB7EC02146FF,588
64128 :CBC6AF2A47FFED5B,578
64136 :A6FDED523804ED53,4E6
64144 :47FF2A4DFF16003A,39C
64152 :A5FD5FFE00200216,3CF
64160 :0119224DFF2AA6FD,3F5
64168 :ED5B49FF1922A6FD,516
64176 :CD7DFBC92146FFCB,5EF
```

(continued on next page)

File

(continued from page 85)

```
64184 :46C8ED4B4DFFED5B,592
64192 :47FF2A49FF19EDB0,52E
64200 :C911BCFDAFED52E5,62E
64208 :C1EBCD07FDC9011C,533
64216 :0021A0FDCD07FDC9,530
64224 :2146FFCB56C821A4,4F4
64232 :FDCB7EC47DFBC921,654
64240 :46FFCB5EC8060A21,457
64248 :A0FDC5E57ECDE0FB,765
64256 :0601CD6CFCE123C1,401
64264 :10F00602CD6CFCC9,40E
64272 :2146FFCB5EC03AA3,43C
64280 :FDCDE0FB3E20CDFD,5E5
64288 :FB3AA3FD4FCDC6FB,5D2
64296 :200721D5FECD61FC,46D
64304 :C921A6FDCD4DFB3E,510
64312 :20CDFDFBC9F52146,542
64320 :FFCB5E200621CCFE,479
64328 :CD61FCF1C9E5237E,5B2
64336 :CDE0FBE17ECDE0FB,6FF
64344 :C921BEFECD61FC21,549
64352 :BAFD360021AAFDCD,4E2
64360 :61FC0601CD6CFC3A,43B
64368 :A1FD3CCDE0FB21C4,5D7
64376 :FECD61FCC906010E,47E
64384 :003AA5FDFE002801,383
64392 :4F21BCFDED5BA6FD,59C
64400 :EDB0C921A1FD4E0C,50F
64408 :C8C5CDA0FBC118F7,65D
64416 :3E07A116005F216F,28B
64424 :FF197ECB39CB39CB,511
64432 :390600214FFF09A6,30D
64440 :77C90620214FFFAF,43C
64448 :B6C02310FBC93E07,472
64456 :A116005F216FFF19,386
64464 :7E2FCB39CB39CB39,489
64472 :0600214FFF09A6C9.3C5
64480 :F51F1F1F1FCDEDFB,506
64488 :F1CDEDFBC9E60FFE,74A
64496 :0A3004C6301802C6,304
64504 :37CDFDFBC9F3CF1C,69B
64512 :F3C9F30601C50601,382
64520 :C50663C5C110FCC1,489
64528 :10F6C110F02146FF,43D
64536 :CBA6CF1DF3D02146,49F
64544 :FFCBE6C97723C9CD,5C9
64552 :02FC38FBCD02FC30,454
64560 :FB47E6F8FE8820EF,5E5
64568 :7821A0FDCD24FC06,461
64576 :1BCD47FC28E1C9C5,502
64584 :E5CD02FC3009E1CD,4DF
64592 :24FCC110F21802E1,42E
64600 :C1E52146FFCB66E1,576
64608 :C97EA7C8E5CDFDFB,6C0
64616 :E12318F53E20C5CD,469
64624 :FDFBC110F7C911BE,5C8
64632 :01ED53C35CAF32C7,480
64640 :5C3246FF11FFFFED,54F
64648 :5347FF2A655C1100,31D
64656 :5CED522249FF1100,3A6
64664 :00ED534DFF062021,36B
64672 :4FFF36FF2310FBC9,51A
64680 :2100401101400 1FF,25B
64688 :173600EDB0C94E23,3D4
64696 :4623ED43845C0120,352
64704 :18ED43885CCD61FC,516
64712 :C9CDA8FC21DBFECD,6C9
64720 :B6FC21EBFECDB6FC,70B
64728 :2107FFCDB6FC2122,4C1
64736 :FFCDB6FC2143FFCD,68E
64744 :B6FCC9F3CF1BF321,654
64752 :46FFFE312003CBCE,520
64760 :C9FE322003CBD6C9,57E
64768 :FE3320E7CBDEC922,4CC
64776 :7BFFED4377FF092B,45C
64784 :7E36003284FF2B7E,322
64792 :36003283FFCB21CB,3B9
64800 :10CB21CB10CB21CB,3AE
64808 :10ED4379FF217FFF,47F
64816 :36002336003E0932,138
64824 :7EFF2A7BFF7E327D,486
64832 :FFCD72FD217FFFCB,5E5
64840 :1623CB1630122181,246
64848 :FF3A7FFFAE327FFF,565
64856 :233A80FFAE3280FF,493
64864 :2179FF7E23B620D9,449
64872 :2A7FFFED5B83FFED,5C7
64880 :52C93A7EFF3D327E,42F
64888 :FF20132A7BFF2322,393
64896 :7BFF3E08327EFF2A,419
64904 :7BFF7E327DFF3A7D,4E5
64912 :FFCB27327DFFED4B,567
64920 :79FF0BED4379FFC9,58C
64928 :0000000000000000,0A0
64936 :0000000000000000,0A8
64944 :0000000000000000,0B0
64952 :0000000000000000.0B8
64960 :0000000000000000,0C0
64968 :0000000000000000,0C8
64976 :0000000000000000,0D0
64984 :0000000000000000,0D8
64992 :0000000000000000,0E0
65000 :0000000000000000,0E8
65008 :0000000000000000,0F0
65016 :0000000000000000,0F8
65024 :0000000000000000,000
65032 :0000000000000000,008
65040 :0000000000000000,010
65048 :0000000000000000,018
65056 :0000000000000000,020
65064 :0000000000000000,028
65072 :0000000000000000,030
65080 :0000000000000000,038
65088 :0000000000000000,040
65096 :0000000000000000,048
65104 :0000000000000000,050
65112 :0000000000000000,058
65120 :0000000000000000,060
65128 :0000000000000000,068
65136 :0000000000000000,070
65144 :0000000000000000,078
65152 :0000000000000000,080
65160 :0000000000000000,088
65168 :0000000000000000,090
65176 :0000000000000000,098
65184 :0000000000000000,0A0
65192 :0000000000000000,0A8
65200 :0000000000000000,0B0
65208 :0000000000005072,17A
65216 :6F673D0020426C6F,310
65224 :636B730042616420,330
65232 :4352432000706173,30C
65240 :7320000840534 54C,297
65248 :454354204F505449,318
65256 :4F4E002240312920,261
65264 :4C6F616420626173,3C6
65272 :696320736F757263,410
65280 :65206F6E6C790042,289
65288 :403229204C6F6164,243
65296 :20636F646520626C,2B9
65304 :6F636B73206F6E6C,331
65312 :7900624033292044,1FB
65320 :6973706C61792063,33D
65328 :6F6E74726F6C2062,350
65336 :6C6F636B73206F6E,351
65344 :6C7900004000C057,27C
65352 :710EF30D2117C61E,2E3
65360 :FF7F761B0313003E,2B3
65368 :003C42427E424200,21A
65376 :007C427C42427C00,29A
65384 :003C424040423CFE,2E2
65392 :FDFBF7EFDFBF7F00,66B
65400 :007E407C40407E00,2B0
65408 :0021107C40404000,1ED
```

to load the Basic segment, which is normally just a bootstrap piece of code, and save it. The second pass will load all the Code segments for the program that is being downline loaded.

The segments should then be saved on microdrive. Information about the start addresses and lengths for these Code segments can be found in the Basic segment loaded or from the write-up in the magazine article.

Failing these two sources providing the necessary information, a third method is available which involves a further pass to obtain a display of the contents of the transmission block headers. Hit any key to display the option menu. Select the required option:

1 For downline loading the Basic segment

2 For downloading any Code segments

3 For getting a display of the transmission header blocks

When the option is selected the screen border will turn black with white bands about ¾in. wide being seen. This is the program trying to synchronise with an incoming transmission block. Now dial the 300bps Telsoft service and remember to switch your modem to line when you hear the modulated data being received.

Whatever option you have selected the screen will be cleared and if the Spectrum is receiving data white bands about twice the width of the synchronising bands will be observed. If this does not occur you have something wrong with your modem setup or connections to the RS232 interface.

After a short while a line of information will be displayed on the top line of the screen giving the programs name and the total number of transmission blocks in hexidecimal that goes to make up the program. This

information gives you an idea of the programs approximate size — most transmission blocks are 286 bytes in length, of which 256 bytes are program bytes — and also the time it wil take to make one pass through the transmission.

If you selected options 1 or 2 loading will now continue with progress being reported on the screen until all transmission blocks have been successfully read.

Loading of program blocks will cease as soon as all transmission blocks have been read successfully with the display of a zero report code and the "OK" message at the bottom of the screen. At this point the communications line may be closed to save telephone charges.

Now comes a very critical part of the downloading process. It is essential that the Basic Clear command is entered at this point before any other action is taken on the keyboard. Once the Clear command has been issued the segments can be saved and verified on microdrive using immediate basic commands.

Most of the Basic program segments need some form of modification so that the program can be loaded from a Microdrive since the normal Telsoft mechanism assumes that your spectrum is not fitted with a Microdrive. This generally is not a difficult process if you are familiar with programming in Basic.

Code segments which need to be loaded in memory at around 25000 decimal or lower cannot be loaded without being corrupted by the download Basic program as it is relocated by the Basic Monitor when an ad hoc Microdrive buffer is created. This problem can be overcome simply by deleting the download Basic program before entering the download machine code at 64000 decimal. This is achieved with the following Basic immediate commands:

NEW — This deletes the Basic download program but preserves the machine code at 64000 decimal.

CLEAR n — This lowers Ramtop to say n if the code segment is to be loaded at (n + 1) decimal.

CLS # — This reinstates shadow system variables.

RAN D USR 64000 Enters the "download0" segment immediately.

RAND USR 64000 Enters the "download" segment immediately.

Always remember to issue Clear and Code segments are loaded.

Transmission blocks consist of a maximum of 286 bytes each being separated from its neighbour with approximately a ⅓ second pause in transmission. The block consists of two distinct parts; the header part which is always 28 bytes long and the data part which can vary in length from 258 bytes down to just three bytes.

Information as to the length of the data part is contained in the header portion. It is the information from the first 10 bytes of the header that is displayed in hexidecimal format as a line item by Option 3 of the download program.

ALPINE ROAD-RACE

▶AJ and PJ Marson
• Amstrad CPC-464
• Bristol, Avon

Race across open grassy plains, over great lakes, through the impenetrable darkness of a tunnel and, finally, over sparse desert-lands in the greatest race ever held on your Amstrad. Hear the pitch of the engine change as you accelerate and wrestle with your joystick as you overtake the other roadhogs on your stretch of road.

You've guessed it — Alpine Road-Race is a perspective car race game which gets its name from the traditional mountain range on the horizon.

Although predominantly Basic, the game runs extremely quickly and without "flickers" due to using machine code for the time-consuming multi-colour graphics and the machine's flashing colour facility. This is a powerful feature that is often overlooked by Basic programmers trying to animate their programs.

To enter the program into your machine, follow these steps;

- Type in and run listing 1 — the Hex-loader.
- Enter the information from listing 2. To save typing, the Tab key has been defined to give a row of zeros.
- When all of the data has been entered, the loader will save the code. Save this somewhere well after the start of the tape — at least 40 on the counter.
- Type in and save listing 3 before the machine code on the tape.
- Rewind the tape and RUN" the program in.

On running, the title screen will come up with some random best times. Two lines from the bottom of the screen, the current control method will be shown. This can be changed by pressing either J or K. Enter will start the game.

When the game starts, there will be two cars near the bottom of the screen. Yours is the higher of the two. If you collide with either of the other cars or steer yours off of the road, your car will explode and your game will end. If, however, you survive until the end of the desert stage, you will be congratulated and the computer will play a tune. If your time is good enough, you will be asked to enter your name for the best timetable.

Conversion to disc: Alter line 2130 to — 2130 MEMORY &807F:LOAD"!ALPCODE",&8080 etc.

```
10 REM LOADER PROGRAM
20 MEMORY &807F
30 MODE 2
40 PRINT"TYPE IN THE MACHINE CODE
  AND CHECKSUM SEPARATED BY A COMMA"
50 PRINT"PRESS <TAB> FOR A LINE OF ZEROS."
60 PRINT:INPUT"START FROM WHERE ?",A$
70 IF A$="" THEN START=&8080 ELSE
   START=VAL("&H"+A$)
75 KEY DEF 68,0,141,141,141
80 KEY 141,STRING$(32,"0")+",000"+CHR$(13)
90 FOR A=START TO &8530 STEP 16
100 PRINT HEX$(A,4);":";
110 INPUT"",D$,CH$
120 IF LEN(D$)<>32 THEN PRINT CHR$(7)
  ;CHR$(27);"NOT ENOUGH DATA";CHR$(27):GOTO 1
00
125 TOT=0
130 FOR B=0 TO 15
140 P=VAL("&H"+MID$(D$,B*2+1,2))
150 POKE A+B,P:TOT=TOT+P
160 NEXT B
170 IF TOT<>VAL("&H"+CH$) THEN PRINT
    CHR$(7);CHR$(27);"CHECKSUM ERROR"
    ;CHR$(27):
GOTO 100
180 NEXT A
190 SAVE"ALPCODE",B,&8080,&4BF,&8480
200 END
```

```
8080:00000000000000000000000000000000,000
8090:00000000000000000000000000000000,000
80A0:00000000000000000000000000000000,000
80B0:00000000000000000000000000000000,000
80C0:00003F11152A000000003F33372A0000,162
80D0:000000632200000003F2A11EBBB003F2A,30E
80E0:3F7BF3F3F3F33F2A3F7BF3F3F3F33F2A,9DE
80F0:3F7BF3F3F3F33F2A3F2A000000003F2A,5C1
8100:00000000000000000000000000000000,000
8110:00000000000000000000000000000000,000
8120:00000000000000000000000000000000,000
8130:00000000000000000000000000000000,000
8140:00000000000000000000000000000000,000
8150:00003F11152A000000003F63372A0000,192
8160:153F11EBBB153F00153FF3F3F3B73F00,682
8170:153FF3F3F3B73F00153F000000153F00,4CB
8180:00000000000000000000000000000000,000
```

(continued on next page)

File

(continued from page 87)

```
8190:00000000000000000000000000000000,000
81A0:00000000000000000000000000000000,000
81B0:00000000000000000000000000000000,000
81C0:00000000000000000000000000000000,000
81D0:00000000000000000000000000000000,000
81E0:0000004100000000000152A33223F0000,114
81F0:00157BF3F33F000000152A00003F0000,333
8200:00000000000000000000000000000000,000
8210:00000000000000000000000000000000,000
8220:00000000000000000000000000000000,000
8230:00000000000000000000000000000000,000
8240:00000000000000000000000000000000,000
8250:00000000000000000000000000000000,000
8260:00000000000000000000004100000000,041
8270:00003FF3B72A000000003F00152A0000,291
8280:00000000000000000000000000000000,000
8290:00000000000000000000000000000000,000
82A0:00000000000000000000000000000000,000
82B0:00000000000000000000000000000000,000
82C0:00000000000000000000000000000000,000
82D0:00000000000000000000000000000000,000
82E0:00000000000000000000000000000000,000
82F0:00000015B70000000000001515000000,0F6
8300:00000000000000000000000000000000,000
8310:00000000000000000000000000000000,000
8320:00002A050A0000000000008741000000,101
8330:00001515822A000000000A4B0A0A0000,13F
8340:0000412A2F8200000000058797000000,23F
8350:00002A150500000000001F000A000000,06D
8360:00000000000000000000000000000000,000
8370:00000000000000000000000000000000,000
8380:0A00000A410041414141000000000A00,163
8390:0000001500000000054105004105410A,0F1
83A0:82000005000000000000158215820000,1B5
83B0:050005050A0041050041004B150F8200,191
83C0:820041150A0000000041000A8782410A,281
83D0:000A05150A0A2A004100416B15000000,164
83E0:00002A0A00000A410A0A0041000A0082,160
83F0:0000050000000000824100000A414100,154
8400:00000000000000000000000000000000,000
8410:00000000000000000000000000000000,000
8420:000000000582000000000A4B15000000,0F1
8430:000015000A8700000000000505000000,0B0
8440:0000058282820A0000008200 1F0A2A00,26A
8450:0000154B0041000000000A15410A0000,10B
8460:000000820A0000000000000000000000,08C
8470:00000000000000000000000000000000,000
8480:018D84218984C3D1BC00008D849284C3,77A
8490:9B8447524150484943D300DD56001E00,541
84A0:AFCB1ACB1B21808019E5DD6E02DD6603,72C
84B0:DD5E04DD5605CD1DBCD10610E50E081A,619
84C0:13AE77230D20F8E1CD26BC10EFC900E1,7B9
84D0:7E23E5FE1BC8CD5ABB18F4CD06B9F53E,914
84E0:FFE5CDA5BBD106041A137723772310F8,755
84F0:F1C30CB9CDA5BBCDDB84D5CDCF84FF0A,AD0
8500:081BE1CDDB84CDCF84FF0B1BC9DD7E00,899
8510:CDB4BBF5DD5603DD5E02DD210000DD19,798
8520:DD4600DD6602DD6E0178FE00280BC5E5,707
8530:7ECDF484E123C110F5F1C3B4BB000000,8B0
```

```
10 REM ALPINE ROAD-RACE
20 REM By A.J. & P.J.Marson
30 REM
40 GOTO 2100:REM INITIALISE PROGRAM
50 INK 4.6.26:INK 5.26.6
60 RESTORE
70 |GRAPHICS.X.Y.0
80 |GRAPHICS.INT(CX(0)).INT(CY(0)).FNCHAR(CY(0))
90 |GRAPHICS.INT(CX(1)).INT(CY(1)).FNCHAR(CY(1))
100 TI1=TIME
110 REM *********** LOOP **************
120 WHILE D<5000
130 D=D+250/S
140 OX=X
150 J=FNJ(CTRL)
160 S=S+(3 AND (J AND 2)=2 AND S<125)+((J AND 1)=1 AND S>5):SPEED INK S.S
170 SOUND 129.800.100.3.0.0.S/4 AND 31
180 X=X-(2 AND (J AND 4)=4)+(2 AND (J AND 8)=8)
190 A=0:GOSUB 340
200 A=1:GOSUB 340
210 |GRAPHICS.INT(OCX(0)).INT(OCY(0)).FNCHAR(OCY(0)):|GRAPHICS.INT(CX(0)).INT(CY(0)).FNCHAR(CY(0))
220 IF OX<>X THEN |GRAPHICS.OX.Y.0:|GRAPHICS.X.Y.0
230 |GRAPHICS.INT(OCX(1)).INT(OCY(1)).FNCHAR(OCY(1)):|GRAPHICS.INT(CX(1)).INT(CY(1)).FNCHAR(CY(1))
240 IF FNPOINT(X+5.Y-9)<>12 OR FNPOINT(X+10.Y-9)<>12 OR FNPOINT(X.Y-15)<>12 OR FNPOINT(X+14.Y-15)<>12 THEN GOTO 1020
250 WEND
260 READ A:NN=NN+1:INK 3.A:IF NN=4 THEN TI2=TIME:GOTO 1490:REM FINISHED
270 D=0
280 CS(0)=CS(0)+8:CS(1)=CS(1)+8
290 IF NN=2 THEN INK 0.0:INK 6.0:INK 7.0 ELSE INK 0.11:INK 6.26:INK 7.13
300 GOTO 120
310 REM DATA FOR CHANGING GROUND COLOUR
320 DATA 2.0.12.9
330 REM MOVE CAR#A
340 OCX(A)=CX(A):OCY(A)=CY(A)
350 CY(A)=CY(A)+(S-CS(A))/10
360 IF CY(A)>119 THEN CY(A)=15:GOTO 410:REM INITIALISE
370 IF CY(A)<15 THEN CY(A)=119:GOTO 410:REM INITIALISE
380 CX(A)=CX(A)+DX(A)*(CY(A)-OCY(A))
390 RETURN
400 REM INITIALISE CAR
410 DX=INT(RND*70)+37
420 DX(A)=(73-DX)/104
430 CX(A)=DX+DX(A)*(CY(A)-15)
440 RETURN
450 REM SET INKS
460 CALL &BD19:READ A:BORDER A:FOR C=0 TO N:READ A:INK C.A:NEXT C
470 RETURN
480 DATA 0.11.1.0.9.6.26.26.13.3.13.21.26.13.8.6.3
490 DATA 1.1.24.20.6.26.0.2.8.10.12.14.16.18.22.1.16
500 DATA 0.0.0.0.0.0.0.0.0.0.0.11.0.0.0.0.0
510 REM SET UP SCREEN
520 ORIGIN 320.0
530 PRINT CHR$(23):CHR$(0)
540 WINDOW#0.1.20.12.25:PAPER#0.3:CLS#0
550 FOR A=-170 TO 170 STEP 4:MOVE A.0:DRAW 0.222.2:NEXT A:REM DRAW ROAD
560 REM DRAW KERBS
570 C=4:L=45:Y=0:MOVE 174.0
580 WHILE L>=1
590 DRAWR -170/222*L.L.C
600 C=C XOR 1
610 L=L*0.8
620 WEND
630 C=4:L=45:Y=0:MOVE -174.0
640 WHILE L>=1
650 DRAWR 170/222*L.L.C
660 C=C XOR 1
670 L=L*0.8
680 WEND
690 REM DRAW MOUNTAINS
700 ORIGIN 0.0
710 H=20
720 A=-4
730 WHILE A<640
740 A=A+4:MOVE A.224:DRAWR 0.H.7
750 H=(H+SGN(RND-0.5)*2)
760 H=H+(4 AND H<6)-(4 AND H>32)
770 WEND
780 REM DRAW SNOW
790 PRINT CHR$(23):CHR$(2):
800 FOR A=240 TO 256 STEP 2
810 MOVE 0.A:DRAWR 640.0.6
820 NEXT A
830 A=-4
840 WHILE A<640
850 A=A+4*(INT(RND*4)+1)
860 PLOT A.238.6
870 WEND
880 PRINT CHR$(23):CHR$(0):
890 WINDOW#0.1.20.1.25
900 RETURN
910 REM SET UP VARIABLES
920 NN=0:REM SECTOR NUMBER
930 CY(0)=15:A=0:GOSUB 410:REM COMPUTER CAR#0
940 CY(1)=60:A=1:GOSUB 410:REM COMPUTER CAR#1
950 S=80:SPEED INK S.S:REM PLAYER SPEED
960 D=0:REM DISTANCE GONE IN SECTOR
970 CS(0)=40:CS(1)=45:REM COMPUTER CAR SPEEDS
980 Y=32:REM PLAYER'S CAR Y
990 IF CX(0)<80 THEN X=96 ELSE X=48:REM PLAYER'S CAR X
1000 RETURN
1010 REM PLAYER DEAD
1020 |GRAPHICS.X.Y.0:INK 4.6:INK 5.26
1030 FOR A=5 TO 7
1040 SOUND 129.0.50.15.0.0.INT(RND*31)+1
1050 |GRAPHICS.X.Y.A
1060 FOR D=1 TO 70:NEXT D
1070 |GRAPHICS.X.Y.A
1080 NEXT A
1090 WHILE SQ(1)>127:WEND
1100 WINDOW#0.1.20.1.25:SPEED INK 20.20
1110 PEN 10:LOCATE 6.13:PRINT CHR$(22):CHR$(1)::A$="GAME  OVER":CALL DBL.@A$.0:PRINT CHR$(22):CHR$(0):
1120 REM WAIT & ENTER TITLE SCREEN
1130 T=TIME:WHILE TIME<T+1500 AND INKEY(47)=-1:WEND
1140 WHILE INKEY$<>"":WEND
1150 REM TITLE SCREEN
1160 MODE 0
1170 RESTORE 490:N=15:GOSUB 460:REM RESTORE COLOURS
1180 WINDOW#1.4.17.4.15:PAPER#1.3:PEN#1.1
1190 REM SET-UP INKS
1200 PAPER 0:PEN 2
1210 A$=SPACE$(2)+"ALPINE ROAD-RACE"
1220 FOR A=1 TO LEN(A$)
1230 LOCATE 1.1:M$=RIGHT$(A$.A):CALL DBL.@M$.0
1240 FOR D=1 TO 50:NEXT D
```

```
1250 NEXT A
1260 GOSUB 1970:REM PRINT HIGH SCORES
1270 LOCATE 1,17:PEN 4:PRINT"CONTROLS:-"
1280 PEN 7:PRINT"  SPEED UP   - A"
1290 PRINT"  SLOW DOWN - Z"
1300 PRINT"  LEFT      - /"
1310 PRINT"  RIGHT     - \"
1320 PEN 12:PRINT:PRINT"CHOOSE CONTROLS.J/K"
1330 PEN 15:LOCATE 6,24:IF CTRL=0 THEN PRINT"JOYSTICK" ELSE PRINT"KEYBOARD"
1340 PEN 3:PRINT TAB(4);"ENTER TO PLAY."
1350 A$=""
1360 WHILE K=0 OR A$="":A$=UPPER$(INKEY$):K=INSTR(1,"JK"+CHR$(13),A$):WEND
1370 IF A$="J" THEN CTRL=0:GOTO 1330
1380 IF A$="K" THEN CTRL=1:GOTO 1330
1390 RESTORE 500:N=15:GOSUB 460:REM CLEAR INKS
1400 MODE 0
1410 LOCATE 6,7:PEN 10:A$="GOOD LUCK!":CALL DBL,@A$,0
1420 GOSUB 520:REM SET UP SCREEN
1430 GOSUB 920:REM SET UP VARIABLES
1440 CALL &BD19:INK 10,0
1450 PAPER#1,0:LOCATE#1,1,7:PRINT#1,SPACE$(40);:REM DELETE 'GOOD LUCK' MESSAGE
1460 RESTORE 480:N=15:GOSUB 460:REM SET INKS
1470 GOTO 50
1480 REM FINISHED SCREEN
1490 RESTORE 490:GOSUB 460:REM RESTORE INKS
1500 MODE 0
1510 PAPER 0:PEN 3:A$="  ALPINE ROAD-RACE"
1520 CALL DBL,@A$,0
1530 PEN 1:A$="CONGRATULATIONS!":GOSUB 1930
1540 PEN 2:A$="On reaching your":GOSUB 1930
1550 A$="objective":GOSUB 1930
1560 ET=ROUND((TI2-TI1)/300,2)
1570 A$="in"+STR$(ET)+" minutes.":GOSUB 1930
1580 GOSUB 1860:REM PLAY MUSIC
1590 IF ET>HI(4) THEN GOTO 1160
1600 MODE 0
1610 WINDOW#1,4,17,1,12:PAPER#1,3:PEN#1,1:CLS#1
1620 GOSUB 1970:REM PRINT HIGH SCORES
1630 LOCATE 6,14:PEN 2
1640 A$="GREAT TIME":CALL DBL,@A$,0
1650 PEN 12:PRINT STRING$(3,10);"Enter your name:-"
1660 WHILE INKEY$<>"":WEND
1670 HI$="***"
1680 A$="*":X=3:PAPER 3:PEN 1
1690 WHILE A$<>CHR$(13)
1700 MID$(HI$,X)=A$:X=(X MOD 3)+1
1710 LOCATE 9,20:CALL DBL,@HI$,0
1720 A$="":WHILE (A$<CHR$(32) OR A$>CHR$(122)) AND A$<>CHR$(13):A$=UPPER$(INKEY$):WEND
1730 WEND
1740 A=0
1750 WHILE ET>HI(A)
1760 A=A+1
1770 WEND
1780 FOR D=4 TO A+1 STEP-1
1790 HI$(D)=HI$(D-1)
1800 HI(D)=HI(D-1)
1810 NEXT D
1820 HI$(A)=HI$
1830 HI(A)=ET
1840 GOTO 1160
1850 REM CONGRATULATIONS
1860 CO=0:RESTORE 1910:REM INITIALISE
1870 READ NOTE:IF NOTE=-1 AND CO<>-1 THEN CO=CO+1:RESTORE 1910:GOTO 1870 ELSE IF CO=2 THEN RETURN
1880 SOUND 1,NOTE,20,15,-(NOTE<>0)
1890 SOUND 4,NOTE*2,20,15,-(NOTE<>0)
1900 GOTO 1870
1910 DATA 60,53,47,45,60,0,45,47,45,40,53,0,53,47,45,36,40,40,45,45,47,53,47,60,0,0,0,0,-1
1920 REM PRINT A$ DOUBLE HEIGHT IN CENTRE OF LINE
1930 LOCATE 11-LEN(A$)/2,VPOS(#0)+3:REM SET CURSOR
1940 CALL DBL,@A$,0:REM PRINT STRING
1950 RETURN
1960 REM PRINT HIGH SCORES
1970 CLS#1
1980 PRINT#1,"  BEST TIMES":PRINT#1
1990 FOR A=0 TO 4
2000 N$=RIGHT$(SPACE$(6)+STR$(HI(A)),6)
2010 K=INSTR(1,N$,".")
2020 IF K=0 THEN N$=RIGHT$(N$+".00",6)
2030 IF K>4 THEN N$=RIGHT$(N$+"0",6)
2040 A$=" "+HI$(A)+" - "+N$
2050 CALL DBL,@A$,1
2060 PRINT#1:PRINT#1
2070 NEXT A
2080 RETURN
2090 REM SET UP PROGRAM
2100 CALL &BC02:REM RESET COLOURS
2110 IF PEEK(&850D)=221 THEN 2140
2120 MODE 1:PAPER 0:PEN 1:LOCATE 14,12:PRINT"PLEASE WAIT.";:PEN 2:PRINT TAB(10);"LOADING MACHINE CODE."
2130 MEMORY &807F:LOAD"!",&8080:CALL &8480:REM LOAD IN AND LOGON "GRAPHICS" RSX
2140 DIM CX(1),CY(1):REM COMPUTER CAR POSITIONS
2150 DIM OCX(1),OCY(1):REM DUMMY COMPUTER CAR POSITIONS
2160 DIM DX(1),CS(1):REM CAR MOVEMENT INFORMATION
2170 CTRL=1:REM DEFAULT TO KEYBOARD
2180 DBL=&850D:REM ADDRESS OF DOUBLE HEIGHT CHARACTERS
2190 ENV 1,10,-1,2
2200 DEF FNPOINT(X,Y)=TEST(X*4,Y*2):REM NEW VERSION OF TEST
2210 DEF FNCHAR(Y)=INT(Y/25)+(Y<35 AND Y>25):REM CHOOSE CORRECT SIZE FOR CAR
2220 DEF FNJ(CTRL)=(JOY(0) AND CTRL=0)+(CTRL=1 AND (((INKEY(69)<>-1) AND 1)+((INKEY(71)<>-1) AND 2)+((INKEY(30)<>-1) AND 4)+((INKEY(22)<>-1) AND 8))):REM 'REPLACES JOY(N) FUNCTION FOR JOYSTICK WHEN CTRL=0 AND KEYBOARD WHEN CTRL=1
2230 REM SET UP HIGH SCORES
2240 DIM HI$(4),HI(4)
2250 FOR A=0 TO 4
2260 FOR D=0 TO 2
2270 HI$(A)=HI$(A)+CHR$(INT(RND*26)+65)
2280 NEXT D
2290 HI(A)=150+20*A+ROUND(RND,2)
2300 NEXT A
2310 GOTO 1160:REM GOTO MAIN SCREEN
```

ARMOURED TOMS

◆BBC ●C. Hughes ●Essex

The idea in this platform game is to fill the bottles at the base of the screen.

You must make your way to the tomato at the top of the screen, avoiding the monsters. You can jump anywhere where there is a girder above you but can only drop through gaps.

You must then get back down to the bottom of the screen to where you started and move to the left to fill the bottle with sauce. Fill all the bottles to win — which is not as easy as it sounds.

Controls are: Z — left; X — right; M — jump.

```
   10 VDU 23,150,120,228,226,195,251,255,255,255
   20 VDU 23,151,30,63,127,255,255,255,255,255
   30 VDU 23,152,255,255,255,255,255,254,252,248
   40 VDU 23,153,255,255,255,255,255,127,63,31
   50 VDU 23,154,0,0,0,0,32,96,192,128
   60 VDU 23,155,0,0,0,0,4,6,3,1
   70 VDU 23,160,231,153,129,165,255,165,165,165
   80 VDU 23,161,231,153,129,165,255,165,255,165,153,90
   90 VDU 23,162,255,255,129,66,36,24,255,255
  100 VDU 23,164,126,36,60,60,60,60,126,255
  110 VDU 23,165,255,255,255,255,255,255,255,126
  120 VDU 23,166,126,126,36,36,36,36,36,66,129
  130 VDU 23,167,129,129,129,129,129,129,129,126
  140 VDU 23,168,248,132,162,129,129,142,144,140
  150 VDU 23,169,164,180,132,136,144,160,254,255
  160 VDU 23,170,28,44,28,124,12,20,34,102
  170 VDU 23,171,56,52,56,62,48,40,68,102
  180 VDU 23,172,0,8,24,56,24,8,24,0
  190 VDU 23,173,8,20,0,32,12,0,4,0
  195 VDU 23,174,8,65,0,0,128,18,32,4
  270 CHAIN"TOMS0"
  280 RUN
 LO.""
Searching
 Escape
   10 MODE 7
   20 PRINT TAB(8,6);CHR$(141);CHR$(135);"ARMOURED TOM'S"
   30 PRINT TAB(8,7);CHR$(141);CHR$(129);"ARMOURED TOM'S"
   40 PRINT TAB(13,10);CHR$(141);CHR$(133);"BY"
   50 PRINT TAB(13,11);CHR$(141);CHR$(131);"BY"
   60 PRINT TAB(10,13);CHR$(141);CHR$(134);"C.HUGHES"
   70 PRINT TAB(10,14);CHR$(141);CHR$(134);"C.HUGHES"
   80 PRINT TAB(10,17);CHR$(129);CHR$(136);"*********"
   90 PRINT TAB(11,18);CHR$(129);"COPYRIGHT"
  100 PRINT TAB(11,19);"6.10.85"
  110 PRINT TAB(10,20);CHR$(129);CHR$(136);"*********"
  120 PRINT TAB(6,1);CHR$(131);"Z-LEFT  X-RIGHT  M-JUMP"
  125 FOR A=1 TO 20:PRINT:NEXT A
  130 CHAIN"TOMS1"
```

(continued on next page)

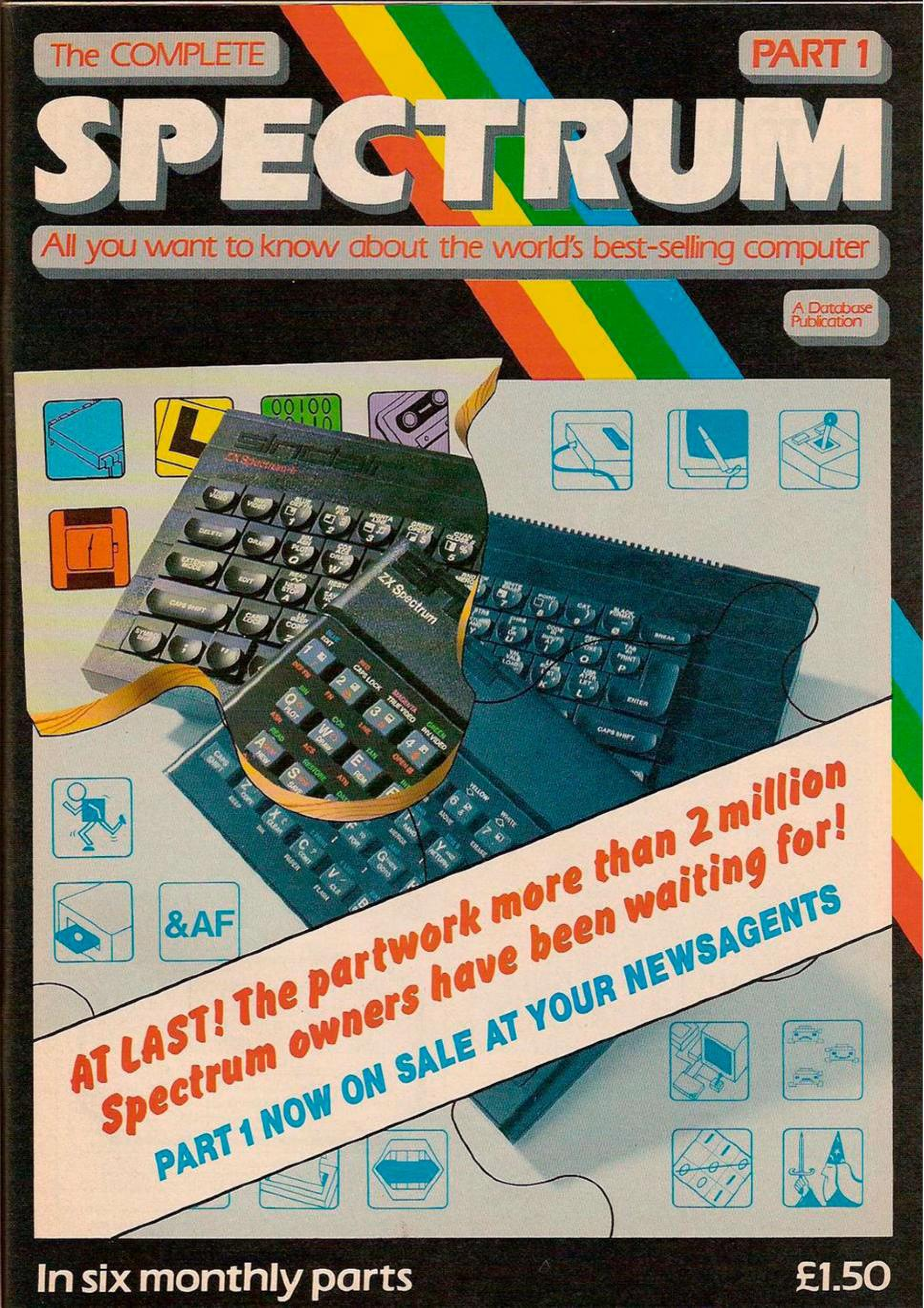
File

(continued from page 89)

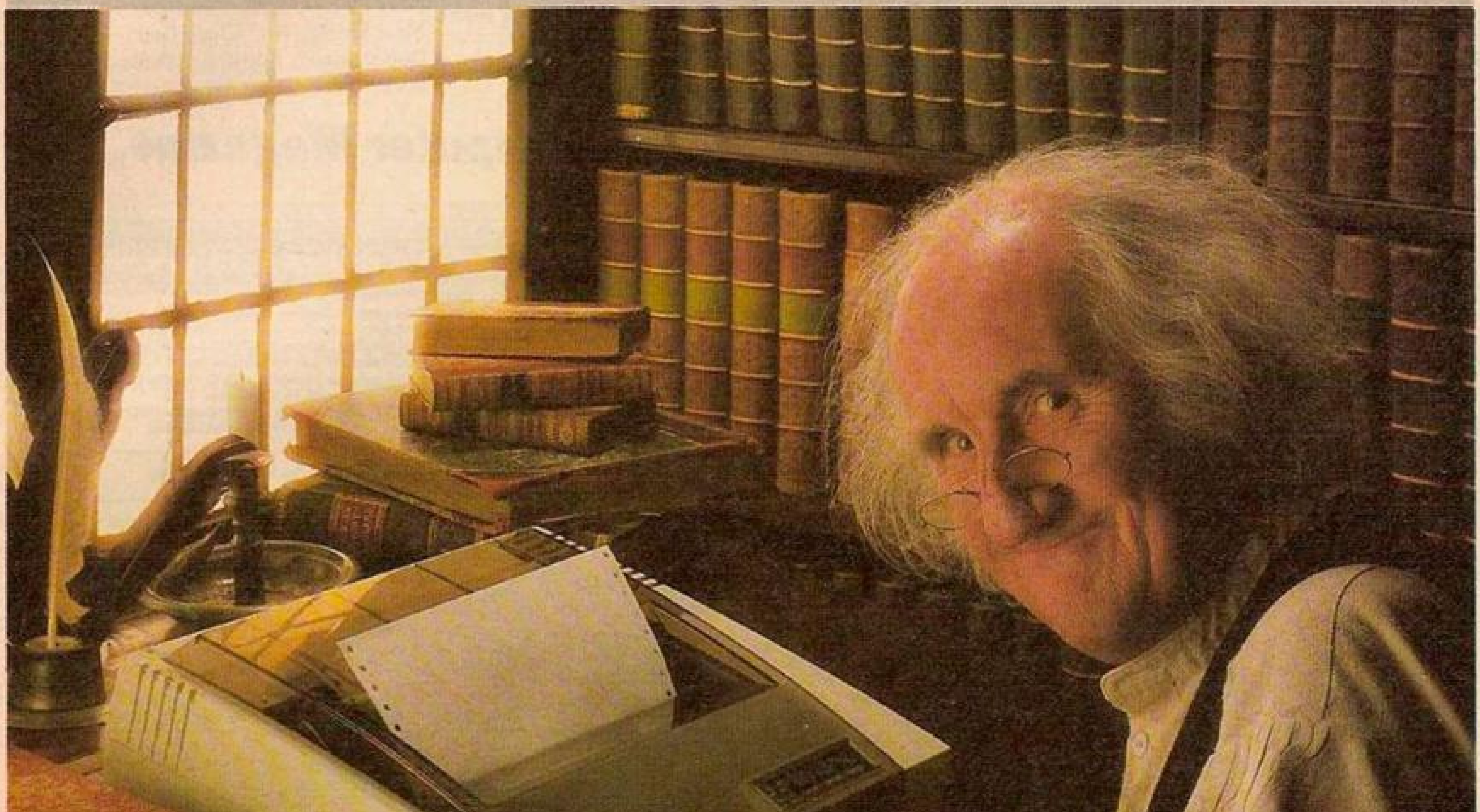
```
LIST
   10 MODE2
   20 SC%=0:LI%=0:LET TM%=0:LET FI%=-2
   30 LET CM%=3
   40 LET B$=CHR$(170)
   50 DIM B%(3.1)
   60 PROCSETUP
   70 PROCSCREEN1
   80 PROCSTOM
   90 PROCYOU
  100 PROCMONST
  110 GOTO 90
  120 STOP
  130 DEF PROCSCREEN1
  140 COLOUR 5
  150 CLS
  160 FOR A%=0 TO 15:PRINT TAB(A%.3):CHR$(162)::NEXT A
%
  170 FOR A%=0 TO 3:PRINT TAB(A%.7):CHR$(162)::NEXT A%

  180 FOR A%=6 TO 10:PRINT TAB(A%.7):CHR$(162)::NEXT A
%
  190 FOR A%=15 TO 19:PRINT TAB(A%.7):CHR$(162)::NEXT
A%
  200 FOR A%=0 TO 6:PRINT TAB(A%.11):CHR$(162)::NEXT A
%
  210 FOR A%=10 TO 15:PRINT TAB(A%.11):CHR$(162)::NEXT
 A%
  220 REM FOR A%=18 TO 19:PRINT TAB(A%.11):CHR$(162)::
NEXT A%
  230 FOR A%=3 TO 19:PRINT TAB(A%.15):CHR$(162)::NEXT
A%
  240 FOR A%=0 TO 14:PRINT TAB(A%.19):CHR$(162)::NEXT
A%
  250 FOR A%=17 TO 19:PRINT TAB(A%.19):CHR$(162)::NEXT
 A%
  260 FOR A%=15 TO 19:PRINT TAB(A%.23):CHR$(162)::NEXT
 A%
  270 COLOUR 2
  280 FOR A%=0 TO 17 STEP 2:PRINT TAB(A%.25):CHR$(166)

  290 PRINT TAB(A%.26):CHR$(167):NEXT A%
  300 COLOUR 3:FOR A%=13 TO 16:PRINT TAB(A%.30):CHR$(1
70):NEXT A%
  310 COLOUR 7:PRINT TAB(0.30):"SCORE ":SC%
  320 ENDPROC
  330 DEF PROCSETUP
  340 ENVELOPE 1.2.-1.-1.-1.255.255.255.120.0.0.-120.1
20.120
  350 ENVELOPE 2.1.5.0.-10.5.5.30.-2.0.-10.126.110 .0
  360 ENVELOPE 3.3.0.0.0.0.0.0.121.-10.-5.-2.120.120
  370 VDU 23.1.0:0:0:0:
  380 *FX 12.25
  390 RESTORE
  400 FOR A%=0 TO 3:READ Z%:LET B%(A%.0)=Z%:NEXT A%
  410 LET X%=18:Y%=22:LETUX%=0:LET UY%=6
  420 FOR A%=0 TO 3:READ Z%:LET B%(A%.1)=Z%:NEXT A%
  430 LET A$=CHR$(160)
  440 ENDPROC
  450 DEF PROCMONST
  460 COLOUR 6
  470 FOR Z%= 0 TO 3:PRINT TAB(B%(Z%.0).B%(Z%.1)):" "
  480 B%(Z%.0)=B%(Z%.0)+RND(3)-2
  490 IF B%(Z%.0)<0 THEN B%(Z%.0)=B%(Z%.0)+1
  500 IF B%(Z%.0)>19 THEN B%(Z%.0)=B%(Z%.0)-1
  510 PRINT TAB(B%(Z%.0).B%(Z%.1)):A$
  520 NEXT Z%
  530 ENDPROC
  540 DEF PROCYOU
  550 X$=INKEY$(0)
  560 IF X$="Z" THEN PROCLEFT
  570 IF X$="X" THEN PROCRIGHT
  580 IF X$="M" THEN PROCJUMP
  590 D%=(X%*64):S%=(31-Y%)*32
  600 IF POINT(D%.S%)=1 THEN PROCTOM
  610 IF POINT(D%.S%)=6 THEN PROCDIE
  620 IF POINT(D%.S%-32)=0 THEN PROCDRO
  630 COLOUR CM%:PRINT TAB(X%.Y%):B$
  640 ENDPROC
  650 DEF PROCLEFT
  660 PRINT TAB(X%.Y%):" "
  670 LET B$=CHR$(170)
  680 X%=X%-1:IF X%<0 THEN X%=0
  690 SOUND 0.-15.1.1
  700 ENDPROC
  710 DEF PROCRIGHT
  720 SOUND 0.-15.1.1
  730 PRINT TAB(X%.Y%):" "
  740 LET B$=CHR$(171)
  750 X%=X%+1:IF X%>19 THEN X%=19
  760 ENDPROC
  770 DEF PROCJUMP
  780 PRINT TAB(X%.Y%):" "
  790 LET Y%=Y%-4:IF Y%<2 THEN Y%=2
  800 FOR E% =130 TO 150:SOUND1.-15.E%.0.02:NEXT E%
  810 ENDPROC
  820 DEF PROCDIE
  830 COLOUR 1
  840 LET CM%=3:LET TM%=0
  850 SOUND 0.-15.28.8
  860 FOR W%=172TO 174
  870 PRINT TAB(X%.Y%):CHR$(W%)
  880 FOR WE%=1 TO 500:NEXT WE%
  890 NEXT W%
  900 LET LI%=LI%+1
  910 PRINT TAB(12+LI%.30):" "
  920 IF  LI%=5 THEN PROCEND
  930 FOR W%=0TO3:PRINT TAB(B%(W%.0).B%(W%.1)):" ":NEX
T W%
  940 PROCSTOM:PROCSETUP:PROCMONST:PROCYOU
  950 ENDPROC
  960 DEF PROCDRO
  970 IF Y%=22 AND TM%=1 THEN PROCFILL
  980 IF Y%=22 AND TM%=1 THEN ENDPROC
  990 IF Y%=22 AND TM%=0 THEN X%=X%+1
 1000 IF Y%=22 AND TM%=0 THEN ENDPROC
 1010 SOUND 2.1.200.6
 1020 FOR W%=Y% TO Y%+4
 1030 PRINT TAB(X%.W%):B$
 1040 FOR AA%=1 TO 50:NEXT AA%
 1050 PRINT TAB(X%.W%):" "
 1060 NEXT W%
 1070 LET Y%=Y%+4
 1080 ENDPROC
 1090 DEF PROCFILL
 1100 COLOUR 1
 1110 LET FI%=FI%+2
 1120 PRINT TAB(FI%.25):CHR$(166)
 1130 PRINT TAB(FI%.26):CHR$(165)
 1140 FOR T%=1 TO 3
 1150 SOUND 1.3.T%+30.1:SOUND 1.3.T%.1:SOUND 1.3.T%+30
.1
 1160 NEXT T%
 1170 LET SC%=SC%+100
 1180 COLOUR 7:PRINT TAB(6.30):SC%
 1190 IF FI%=16 PROCWIN
 1200 LET TM%=0:LET CM%=3
 1210 PROCSTOM
 1220 ENDPROC
 1230 DEF PROCTOM
 1240 LET TM%=1:LET CM%=1
 1250 PRINT TAB(0.0):"  ":PRINT TAB(0.1):"  ":PRINT TA
B(0.2):"  "
 1260 LET SK%=RND(100)
 1270 LET SC%=SC%+SK%
 1280 SOUND 1.2.100.10
 1290 COLOUR7:PRINT TAB(6.30):SC%
 1300 FOR W%=1 TO 100:COLOUR13:PRINT TAB(0.1):SK%:NEXT
 W%
 1310 PRINT TAB(0.1):"   "
 1320 ENDPROC
 1330 DEF PROCSTOM
 1340 COLOUR 2:PRINT TAB(0.0):CHR$(155):CHR$(154)
 1350 COLOUR 1:PRINT TAB(0.1):CHR$(151):CHR$(150):TAB(
0.2):CHR$(153):CHR$(152)
 1360 ENDPROC
 1370 DEF PROCWIN
 1380 FOR W%=180 TO 70STEP-10:SOUND1.-15.W%.3:SOUND 2.
-15.W%.3:NEXT
 1390 FOR W%=60 TO 150 STEP 20:SOUND 1.-15.W%.6:SOUND
2.-15.W%.6:NEXT
 1400 COLOUR 2: PRINT TAB(5.13):"Y":COLOUR 3: PRINT TA
B(6.13):"O":COLOUR 4:PRINT TAB(7.13):"U"
 1410 PRINT TAB(9.13):" ":COLOUR 2: PRINT TAB(10.13):"
W":COLOUR 3: PRINT TAB(11.13):"I"::COLOUR 4:PRINT TAB(
12.13):"N"
 1420  COLOUR 1:PRINT TAB(1.17):"ANOTHER GAME? Y/N"
 1430 FOR A%=1 TO 1500:NEXT A%
 1440 LET B$=INKEY$(0)
 1450 IF B$="Y" THEN RUN
 1460 IF B$="" THEN GOTO 1440
 1470 CLS
 1480 END
 1490 ENDPROC
 1500 DEF PROCEND
 1510 COLOUR 2: PRINT TAB(5.13):"G":COLOUR 3: PRINT TA
B(6.13):"A":COLOUR 4:PRINT TAB(7.13):"M":COLOUR 7:PRIN
T TAB(8.13):"E"
 1520 PRINT TAB(9.13):" ":COLOUR 2: PRINT TAB(10.13):"
O":COLOUR 3: PRINT TAB(11.13):"V"::COLOUR 4:PRINT TAB(
12.13):"E":COLOUR 7:PRINT TAB(13.13):"R"
 1530  COLOUR 1:PRINT TAB(1.17):"ANOTHER GAME? Y/N"
 1540 PROCSPEECH
 1550 FOR A=1 TO 9
 1560 READ  A%
 1570 CALL SAY
 1580 NEXT A
 1590 *FX 21.0
 1600 FOR A%=1 TO 1500:NEXT A%
 1610 LET B$=INKEY$(0)
 1620 IF B$="Y" THEN RUN
 1630 IF B$="" THEN GOTO 1610
 1640 CLS
 1650 END
 1660 DATA 17.15.9.8.10.14.18.6
 1670 DATA 34.20.16.4.1.53.35.52.0
 1680 RESTORE
 1690 DEF PROCSPEECH
 1700 P%=TOP+100
 1710 [OPT 0
 1720 .SAY
 1730 STA &FE41
 1740 LDA #&0A:STA &FE40
 1750 LDA #&2:STA &FE40
 1760 .WAIT
 1770 LDA #&40
 1780 BIT &FE40
 1790 BEQ WAIT
 1800 RTS
 1810 ]
 1820 ENDPROC
```


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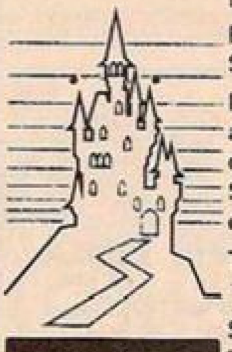
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6 Central Street, Manchester M2 5NS.
Telephone: 061 832 6633 Telex: 669977 Oceans G
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